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AN INQUIRY

INTO THE

PHYSIOLOGICAL AND MEDICINAL PROPERTIES

OF THE

ACONITUM NAPELLUS.

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INTO THE

PHYSIOLOGICAL AND MEDICINAL PROPERTIES

OF THE

ACONITUM NAPELLUS;

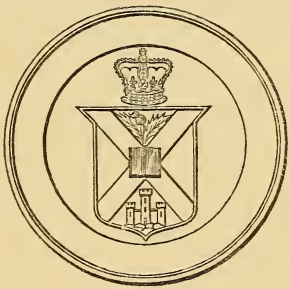
TO WHICH ARE ADDED

OBSERVATIONS ON SEVERAL OTHER SPECIES OF ACONITUM.

BY

ALEXANDER FLEMING, M.D.,

PRESIDENT OF THE ROYAL MEDICAL SOCIETY OF EDINBURGH.



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TO

ROBERT CHRISTISON, M.D., F.R.S.E.,

PROFESSOR OF MATERIA MEDICA IN THE UNIVERSITY OF EDINBURGH, &c.,

IN ADMIRATION OF THE

DISTINGUISHED TALENTS AND HIGH SCIENTIFIC ATTAINMENTS
WHICH HAVE PLACED HIM IN THE FIRST RANK OF HIS
PROFESSION,

THIS TREATISE

IS RESPECTFULLY DEDICATED, BY HIS LATE PUPIL,

THE AUTHOR.

PREFACE.

The following Inaugural Dissertation obtained from the Senatus Academicus of Edinburgh a Gold Medal at the Graduation of 1844, and printed in accordance with the recommendation of the Medical Faculty, is now submitted to the Profession. In preparing it for publication, condensation has been studied, as far as was consistent with clearness and accuracy; the section treating of the History and Botanical Characters of the plant has, with this view, been much curtailed, and its Chemistry entirely omitted, as every thing satisfactorily ascertained respecting it is to be found concisely and well detailed in the admirable and complete Materia Medica of Dr Pereira. The desire of the Author has simply been to retain nothing that did not immediately relate to his own investigations.

It may appear remarkable that the Aconitum Napellus, a plant possessed of such energetic

physiological and medicinal properties, should have been so little employed; but this may be, in part, accounted for by the variable strength and frequent entire inertness of the preparations commonly in use, and partly also by the fact of inert species having been substituted for it, as, for instance, the A. paniculatum, which has been directed by the London and Dublin Colleges as the officinal species, and which is shewn in this Inquiry to be destitute of medicinal properties.

One important object of the Author's experiments was to distinguish the inert from the active species of the plant. In 1842 he performed the series of experiments on animals; and, in the autumn of 1843, commenced his observations, which he has continued to the present time, of the Physiological and Therapeutic action of the remedy on man. His residence, during this period, in the Royal Infirmary, afforded him every facility for hourly and continual observation of its effects, which were noted with scrupulous care and accuracy; and such were the advantages resulting from its employment, that the Author trusts he may, without impropriety, express his conviction of its great utility, and

his strong hope that its use will be greatly extended.

The Author derives much pleasure from the opportunity thus afforded him of acknowledging the debt of gratitude he owes to Professor CHRISTISON, whose valuable suggestions and kind encouragement have done much to bring this Thesis to its present form—to Professor HENDERSON, Drs PATERSON, DUNCAN, and CORMACK, for their kindness, in permitting him to publish cases occurring under their charge—to Professor GRAHAM and Mr M'NAB, for their kindness in affording him all the advantages to be derived from the Botanical Garden—to Professor BALFOUR, Dr GEORGE WILSON, Dr RICHARD YOUNG, and Mr SPENCE, for their able as well as kind assistance in forwarding his inquiries.

ROYAL INFIRMARY, EDINBURGH,
June 1845.

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SECTION FIRST.

HISTORY, BOTANY, AND PHYSICAL CHARACTERS OF THE ACONITUM NAPELLUS.

LITTLE if any thing is known regarding the ancient history of Monkshood. The Roman poets were in the habit of using the word Aconite to denote vegetable poisons generally, doubtless from the deadly character and high reputation as poisons of the plants which were known by that name.* Theophrastus, Dioscorides,

* "Qui dedit ergo tribus patruis Aconita, vehetur
Pensilibus plumis ——"

Juvenal, First Satire, v. 156.

"Lurida terribiles miscent Aconita novercæ."

Ovid Metamorph. l. i. v. 47.

Pliny, Galen, Nicander, Sennertius, and others, notice various species of Aconite; but not only are the descriptions which they give of them so contradictory as to shew that they had entirely different plants in view, but in no case do the characters furnished by them correspond with those of the Aconitum Napellus. Members of the genera Ranunculus, Helleborus, Doronicum, &c., seem, in most cases, to have been the plants known to them under the name of Aconite; and, in one case only, that of the second species mentioned by Dioscorides,* apparently the A. lycoctonum, does any plant at present included in the genus appear to have been described. The Aconite of Pliny,† as well as the first species of Dioscorides, seems to be the Ranunculus Thora.

It is to Störck that we are indebted for the introduction of Aconite into practice.‡ Many others have, since his day, directed their attention to its therapeutic properties, especially in Germany, where it has been much more extensively used than in this country.

The Aconitum Napellus belongs to Linnæus' class and order *Polyandria Trigynia*, and to the order and suborder *Ranunculaceæ Helleboreæ* of Decandolle. Much difficulty has been experienced by botanists in arranging

* De Materia Medica.

† Natural History.

‡ On the use of Stramonium, Hyoscyamus, and Aconitum. Lond. 1763.

the numerous species and varieties of the genus to which it belongs. Decandolle has included all the varieties at present known, amounting to 107, in 22 species, which he has classified under four sections, viz. Anthora, Lycoctonum, Cammarum, and Napellus. They are for the most part tall, herbaceous plants, with yellow, white, and sometimes variegated floral envelopes. They flower in May, June, or July.

Several species have been used in medicine, as the A. Anthora, lycoctonum, paniculatum, lasiostonum, helegynum, intermedium, &c.; but in another part of this inquiry I have given what seem to me conclusive reasons for selecting the A. Napellus as the officinal species. The A. paniculatum has been adopted by the Dublin and London Colleges, on the supposition that it was the species used by Störck. I have distinctly ascertained, however, that it is totally inert; an observation which Dr Christison has fully confirmed. The following are the botanical characters of the A. Napellus, as given by Lindley.*

Gen. Char.—Sepals petaloid, irregular, deciduous, or withering, the upper sepal concave, and helmet-shaped. Petals 2, on long stalks, prolonged at the apex into a bag hidden beneath the helmet.

Spec. Char.—Stem always quite simple. Leaves completely divided to the base into 5 wedge-shaped lobes, which are 3-fid; their segments being also slashed, linear, and acute, usually callous at the re-entering angles. Ra-

* Flora Medica, p. 9.

ceme cylindrical, quite simple. Flowers deep purple, hairy. Helmet semicircular, gradually ending in a point. Wings hairy inside. Ovaries 3, smooth.

Decandolle admits no fewer than 29 varieties of the A. Napellus, which are distinguished by the dense or loose condition of the inflorescence, the breadth and number of the slashes of the leaves, downiness of the various parts, and other variations, which depend on the moisture, temperature, and height of the situation in which the plant is found.

It is an elegant plant, from two to six feet in height, with dark green leaves, and a beautiful raceme of rich blue flowers.

It grows in elevated grounds in many parts of Europe. It is the only member of the genus which has obtained a place in our British Floras, having been found in many parts both of Scotland and England, although in general it seems to have strayed from gardens. Though it is difficult to distinguish it from the A. paniculatum by defined botanical characters, yet the general appearance of the two plants is very different. The latter is known by its lengthened helmet and loose panicled inflorescence. Its flowers are of a paler colour than those of the A. Napellus—its leaves less divided—and its tubers smaller and of a more rounded form. It also flowers several weeks later in the season.

The properties of the A. Napellus do not suffer change by *cultivation*, and, in all probability, are as little influenced by *climate*. Linnæus mentions cases occurring in mountainous districts, where large quantities of it were eaten with impunity; but we may safely conclude, from the numerous facts on record, all of which tend to an opposite conclusion, that other species of the plant were used in the instances alluded to. M. Geiger alleges that the A. Tauricum, a variety of the A. Napellus, loses much of its power by cultivation. I may state, however, that I found a specimen of this variety, which had been in cultivation in the Botanic Garden of Edinburgh for several years, to possess as much activity as any plant of the species I ever examined.

The *root* is formed of two parts,—a tapering root-stock and one or more pyriform tubers, attached by narrow necks to its upper part. From both proceed numerous fibrillæ, of a dark colour and woody texture. The root-stock seldom exceeds, at its upper part, the thickness of the middle finger. It is of a very dark brown or even black colour externally. Its internal texture is white and soft; on the approach of autumn becoming succulent and spongy, after which it rapidly decays. A longitudinal section shews a cavity of variable size, divided into cells by transverse septa.

The *tubers* vary much in size, but are generally between three and four inches in length, and at their upper

part from half an inch to one inch in breadth, becoming attenuated and filiform inferiorly. They are of a much lighter brown than the root-stock; and, when fresh, their surface is smooth, becoming rough and corrugated when dry. Internally they are of a white colour and fleshy texture; and, on being cut into, they emit an odour resembling very much that of the wood of the black currant; but this is lost in a few minutes, being succeeded by an earthy and disagreeable smell. The section on being exposed to the air changes to a pinkish hue; then becomes brown, and afterwards greyish white. It is flexible and tough when moist, hard and fragile when dry, breaking with a starchy fracture. The dried root, when bruised, likewise emits a strong smell of the wood of the black currant.

The tuber consists of two parts, a cortical or external, and a medullary or internal. This structure is more apparent after the section has been for some time exposed to the air,—when the line of separation assumes a darker colour than the texture on either side. On making a transverse section, the medullary portion is seen to present an irregularly stellate appearance. When fresh, the outer portion is firmer and more fleshy than the inner, which, however, is more elastic. On exposure to the air, the former assumes a much deeper brown hue than the latter. They are identical in their microscopical structure, and possess equal medicinal activity.

The tuber has a somewhat bitter taste, and when chewed, causes numbness and tingling in the lips and tongue. (See Topical Action). As far as I have been able to observe, these symptoms are produced with equal intensity by roots grown in damp shaded ground, and by those which are reared in dry airy situations, with a sunny exposure. In order to preserve the tuber for medicinal purposes, it must be cut into thin slices, which are to be dried slowly at a low temperature. In bruising it, care should be taken to prevent the powder from entering the eyes and nostrils.

The seeds are hard, black, and shrivelled, when ripe, which they generally are in the second or third week of August.

The stem, leaves, flowers, fruit, and seed, are destitute of smell; but all possess, more or less, the property of exciting numbness and tingling when chewed; nor is this diminished in any part of the plant by its being dried slowly at a low temperature. The different parts of the plant, however, vary much in the degree in which they excite these sensations.

To ascertain their respective activity, I prepared tinctures of all of them, in every case the proportions of the part employed, and spirit being those indicated for the preparation of the tincture of the root.* From the comparative observations which I then made, I drew

* See section on Administration.

the following conclusions :—*First*, The tuber is the most powerful part of the plant. Two doses of five minims of the tincture, an interval of two hours intervening, produce the effects described under the second degree of operation. (See Physiological Action in medicinal doses.) When chewed, it causes more intense numbness and tingling than any other part of the plant. *Second*, The sensations felt on chewing the seeds, are considerably less intense than in the former case. Generally speaking, a third, or even a fourth dose, of five minims of their tincture, is necessary to induce the second degree of operation. *Third*, Three doses, of ten minims each of the tincture, prepared from leaves gathered before the flowering season, are requisite to effect the same object. *Fourth*, The flowers rank next in point of activity; while the fruit and stem are the least active of the whole, only slight numbness and tingling being produced by them, and that only after continued chewing or brisk application of their tinctures.

Influence of Season on the activity of the roots and leaves.—The tuber is more active immediately after the period of flowering, than at any other time. It has then attained its largest size. Soon afterwards the bud of the plant of the succeeding year begins to shoot out from its apex, during the gradual development of which, a perceptible diminution in its activity may be detected. The tuber of this year becomes the root-

stock of the next, in the autumn of which it rots and dies. Thus the root is biennial, and the stem annual.

The activity of the leaves continues from their first appearance till the seeds begin to form, after which it quickly diminishes, though the leaves are at that period even more matured in size than before. (Christison and Geiger.)

From these observations it follows:—

First, That the root is the most eligible part of the plant for medicinal use, both on account of its greater activity, and also from the ease with which it may be obtained in large quantity; and,

Secondly, That the leaves ought to be gathered before or during the flowering season, and the tuber soon after it.

SECTION SECOND.

PHYSIOLOGICAL ACTION OF THE A. NAPELLUS ON ANIMALS.

Aconite, when introduced into the system of one of the lower animals, produces, in the first instance, weakness of the limbs and staggering. The breathing then becomes either slightly accelerated, or slow and labouring. The paralysis increasing, the animal is at last unable longer to support itself, and lies down upon its side, with the extremities stretched out in a relaxed state. The general sensibility of the surface is impaired, and, towards the fatal termination, is altogether lost. Blindness, to a greater or less extent, soon supervenes; the breathing becomes gradually slower and more imperfect; and after a few spasmodic twitches, death by *Asphyxia* ensues.

On examination of the body immediately after death, the heart is found beating with considerable strength, nor does its action cease for some time. The peristaltic motion of the intestines also continues. The irritability of the voluntary muscles is impaired, as is evinced by their being less easily excited to contraction by mechan-

ical irritation, than is usually the case, although they still respond readily to galvanism. General venous congestion exists; the right side of the heart is distended; there is engorgement of the venæ cavæ, of their tributary veins, and frequently of the brain; venous blood may usually be detected in the left side of the heart and in the aorta. The blood coagulates, and the muscles become rigid as usual.

Generally speaking, as already stated, only a few spasmodic twitches occur, such as are usually observed in death by asphyxia from whatever cause. In some of the experiments detailed in the Appendix, however, there were decided convulsive movements, and, in two, distinct opisthotonos, evidently the effect of *congestion of the brain*, the existence of which state was inferred from the fact that the convulsions did not, in general, occur until the animal had been under the influence of the poison for some time, when, from the advancing asphyxia, there must have been a highly congested condition of the venous system. This view was confirmed by the post-mortem examinations.

In general, the *pupil* is more or less *contracted*, dilating to its natural size immediately on the cessation of the respiration. This symptom seems attributable to the same pathological cause as the convulsions, and for the same reasons. It was present in all the cases in which convulsions occurred. In the two experiments (20, 21),

on the other hand, in which the Muriate of Aconitina was injected into the veins, and where, from the rapidity of the fatal result, very slight venous congestion could have existed, the pupils dilated, and continued to do so up to the moment of death; apparently shewing, that *dilatation* is the specific or direct effect of Aconite on the pupil. (See its local action on the pupil, in the topical effects on Man.)

One of the most characteristic symptoms of the action of the poison is *muscular paralysis*. This affects, first, the muscles of the extremities, afterwards those of the trunk, and finally proves fatal, by extension to the muscles of respiration. The topical effect of the Muriate of Aconitina, in destroying muscular irritability, is well illustrated in Experiments 3, 5, 19, and 27.*

The *common sensibility* is always more or less impaired. This is a point on which it is sometimes difficult to judge, as from the paralysis the animal has little or no power to express sensation. I have, however, repeatedly observed entire loss of feeling, when the paralysis was not complete. In all the experiments which I performed, winking followed irritation of the cornea, as long as the breathing continued,—a circumstance which may, at first sight, appear to indicate the existence of sensation. I cannot, however, look on it in any other light, than as an effect of simple reflex action. Nor is this view of the case at all invalidated by the fact, that this

* See Appendix, Part First.

reflex action is, in the normal state, accompanied by sensation, seeing that the latter, though co-existing with, is not, as has been satisfactorily established, essential to it.

That a sedative action is exerted on the *heart*, is shewn in Experiments 14 and 15, in which the pulse became rapidly weaker, and less frequent. When the dose is large, and proves quickly fatal, the heart is comparatively little affected; and, certainly, death is not produced by failure of the circulation. In many of the experiments contained in the Appendix, the heart continued to beat for some time after death;—in one case, for a whole hour. When the fatal result is preceded by long-continued dyspnœa, the action of the heart is considerably impeded. Thus, in several instances in which I opened the body immediately after death, the heart was found contracting feebly, and soon ceased to do so at all: "A physiological phenomenon, not connected with any peculiar action of the poison on the heart; but, which is common to all modes of death, by slowly formed asphyxia."*

The action of Aconite, when introduced into the *stomach*, is peculiarly interesting, from the difference of effect observed in different animals, as in the rabbit and dog. In Experiment 10 (which I repeated several times), a quarter of a grain of Aconitina, mixed with a

* Christison on Hemlock and Conia. Edin. Roy. Soc. Transactions, vol. xiii.

little lard, introduced into the stomach of a rabbit, produced no effect whatever. This peculiarity may have arisen either from a power of selection on the part of the mucous membrane, whereby it refused to absorb the poison, or from a peculiar property possessed by the gastric juice, by which the poison was neutralized. That the latter hypothesis affords the true explanation of the phenomenon, is proved by two experiments. In one of these (Experiment 19), a quarter of a grain of Aconitina mixed with lard was introduced into the rectum of a rabbit, and speedily proved fatal, shewing that had the first view been correct, and that the stomach and intestines had refused to absorb the Aconitina, it would, in all likelihood, have been taken up on its arrival at the rectum. Again, that no such power of selection is possessed by the stomach of the rabbit, was shewn by Experiment 11, where a quarter of a grain of Aconitina, dissolved in diluted muriatic acid, proved quickly fatal. In this case, speedy absorption, favoured by the fluid form of the poison, took place. In those instances, on the other hand, where the drug was administered in the solid form, absorption could not go on for some time; before which it seems highly probable that the gastric juice interfered, and, by the peculiar property it appears to possess, neutralized the poison.

This view is further confirmed by Experiments 16, 17, and 18, in which the Aconitina, after having been

exposed to the action of a digestive liquor prepared after the manner recommended by Schwann,* in one case from the stomach of a rabbit, and in two from that of a calf, was injected into the cellular tissue of rabbits, and was found to act with much less energy than usual. In the 3d Experiment, in which only a small quantity of Aconitina (one-twelfth of a grain) was used, the animal remained uneasy, and was affected with weakness of the extremities for about four hours, but afterwards recovered completely. In a comparative experiment, where the same amount of the poison, in the form of muriate, was employed, death occurred in eleven minutes.

In Experiments 12 and 13, where the poison was introduced into the stomach of dogs, recovery took place in consequence of their having freely evacuated the ingesta by vomiting. In Experiment 14, a quarter of a grain of Aconitina was introduced into the stomach of a dog, and the œsophagus was tied. The animal died in five hours. In Experiment 15, *half* a grain of the Aconitina was used, and death ensued in one hour, although the œsophagus was not tied, part only of the poison having been discharged by vomiting.

It is thus evident that Aconitina proves fatal to dogs when administered by the stomach, acting, however, much more slowly than when introduced into the cellular tissue—a fact easily explained by the comparatively

* Müller's Archiv., 1836, p. 90.

weak absorbing power of the mucous surface of that viscus.

I have never observed Aconite produce such a change in the vascularity of any part to which it was applied, as was sufficient to prove an *irritant action.* In Experiments 14 and 15, a slight blush of redness was noticed in different parts of the stomach and intestines, but not greater than was fully accounted for by the very severe and long-continued vomiting which had occurred. Bonet states, that in a dog which he poisoned by the fresh root, not the slightest trace of inflammatory action was detected in the stomach.* On the other hand, Orfila affirms, that marks of inflammation were found, on dissection, in the thigh of a rabbit, into the cellular tissue of which a *very weak* watery extract had been introduced thirty-six hours previously. In many other experiments, however, in some of which the poison was introduced into the stomach, and in others into the cellular tissue, he met with no such appearances.†

The rapidity and intensity of the remote effects of Aconite, are in direct proportion to the absorbing powers of the part to which it is applied, producing no effect when placed in contact with the skin, and acting with less energy when taken into the stomach than when introduced into a serous cavity, or into the cellular tissue.

* Sepulchretum Boneti, p. 493, t. iii.

† Toxicologie, 1843. ii., 353.

It acts with the greatest energy and rapidity, when introduced directly into the circulation.

There is no important difference in character between the action of Monkshood and that of its alkaloid Aconitina. The latter is, therefore, the true active principle of the plant.

The experiments, generally, afford a good illustration of the law in physiology, that "the action of poisons which operate by entering the blood, although it may be somewhat lessened, cannot be destroyed or altered in their chemical combinations."* Thus it will be observed, that the muriate and the aconitate of Aconitina, which are so much more soluble than the Aconitina itself, act with greater energy and rapidity on that account, but produce precisely similar effects.

From several experiments performed on the *Infusoria*, I ascertained that Aconite is poisonous to them in common with other animals. For the interesting particulars of its action, see the detailed experiments (29, 30, 31.)

Lastly, Numerous experiments (32, 33) justify me in affirming, that Aconite is a direct sedative poison to *vegetables*. A healthy plant, whose root is introduced into water impregnated with it, speedily begins to fade; its leaflets lose all their original freshness, hang over the edge of the glass, and soon shrivel and die.

* Christison on Poisons, 1845, p. 26.

SECTION THIRD.

PHYSIOLOGICAL ACTION OF THE ACONITUM NAPELLUS ON MAN.

Division I.—*Topical Action.*

Aconite, when applied externally, acts as a *direct sedative to the nerves of sensation.* When a small piece of the root is chewed, the flow of saliva is increased, and heat and tingling, followed by numbness, are felt in the lips and tongue. A sense of swelling or distention is also perceived in these parts, and the motion of the lips is less free than natural. The effects of the alkaloid are similar, but more intense.

If a larger piece of the root be chewed, a small portion of which is swallowed, the palate and throat are affected, and the uvula feels as if elongated and in contact with the tongue. A sense of constriction of the throat even to a painful degree, is also occasionally experienced. When any preparation of the drug is applied to the pituitary and conjunctival membranes, similar effects are produced as on the lips, while their respective secretions are much

increased in quantity. When the pituitary membrane is affected, frequent sneezing is induced, and a sensation resembling that which attends a severe cold of the head is perceived. These effects continue for a longer or shorter period, according to their intensity, sometimes for many hours.

The alkaloid, or the tincture of the root, when applied to the skin, causes intense heat and tingling, to which succeed numbness and a sense of tightness or dragging. In consequence of the mechanical barrier presented to the action of the drug by the cuticle, the skin requires to be briskly rubbed with the preparation for a considerable length of time. Slight redness is thus produced, but no more than may be accounted for by the simple act of friction.

Aconite impairs the *common sensibility* of the part to which it is applied. Thus, when the lips are severely affected, their mutual pressure is not perceived, and very little pain is experienced on their being pinched. That it also impairs the function of the nerves of *special sensation* is shewn by the fact, that when the tongue or nostrils are affected, their respective senses are much blunted. Its sympathetic action on the *retina* is remarkable. When applied to one of the temples or one side of the forehead, more or less blindness of the same side is frequently produced.

The topical effects of Aconite are, as might readily be supposed, most marked when it is applied to a surface

abundantly supplied with nerves. Thus, if a piece of the root be slightly chewed and then rubbed vigorously on the hard palate, numbness and tingling will come on with their usual intensity in the lips and tongue, while they will hardly be perceptible in the palate. In the same way, the tips of the fingers are more readily affected than any other part of the integuments.

Its local action on the *muscular system* is also of a *direct sedative* character. For examples of this action, see Experiments 3, 5, 19, and 27, in none of which did any muscular excitement precede the paralysing influence.

Its topical application is, as far as I have seen, *unaccompanied either by pain, redness, or swelling*, even when the physiological effects are developed to the fullest extent. Some have believed it capable of exerting a stimulant action on the vascular system, an opinion which, as has already been shewn, meets with no support from my experiments on animals. It has been asserted that the peculiar sensations produced by chewing the root are accompanied by slight inflammatory action; but careful observation has convinced me that this is not the case. Nor is the increase in the lachrymal, pituitary, and salivary secretions, already noticed, to be regarded as the effect of any irritant action of the drug, but simply as the fruit of the sympathy existing between the nerves of the mucous membranes and the secreting organs. Other authors assert that the leaves, when applied to the skin, produce

an erysipelatous inflammation, with an eruption of vesicles. This experiment I have repeatedly tried without once meeting with such a result. Others bring forward cases of poisoning, in which inflammatory appearances were found in the intestinal canal after death. To these I shall allude, when treating of the action of Aconite in poisonous doses.

When the conjunctiva is slightly painted with the ointment of Aconitina, *contraction of the pupil* speedily takes place, and continues for several hours.* Mr Pereira has observed contraction of the pupil in some amaurotic cases of several years standing, and where the iris underwent no change on exposure to strong light. When, on the other hand, the ointment of the alkaloid, or the tincture of the root, is applied to the temple or forehead, the pupil occasionally becomes *dilated.* I have only seen this latter occurrence in two cases, in both of which it was accompanied by partial blindness of the same eye. These phenomena are either effected by reflex action through the fifth and third nerves, or perhaps by imbibition; but why such entirely opposite effects should ensue in thetwo cases, it is difficult to understand.

I may mention that I have several times anointed the eyelids with the alcoholic extract, in the same way as Belladonna is usually applied for the purpose of producing

* See Appendix, Part First, Experiment 23.

dilatation of the pupil, but without the slightest effect; a circumstance perhaps accounted for by the fact that the action of Aconite on the skin is only developed after considerable friction has been employed.

Division II.—*Physiological Action on Man in small or medicinal doses.*

I shall, in the first place, take a general view of the ordinary effects of Aconite in small or medicinal doses; and, for the sake of convenience, shall consider these under four degrees of operation.

First Degree of Operation.—In the course of twenty minutes or half an hour, after the exhibition of five minims of the tincture, a feeling of warmth in the stomach is usually experienced, which is occasionally accompanied by slight nausea and oppression of the breathing. After the lapse of thirty or forty minutes, this sense of warmth is diffused throughout the body, and, in a few minutes more, is attended by numbness, tingling, and a sense of distention of the lips and tongue. There is also tingling at the tips of the fingers, and a peculiar sensation is felt at the roots of the teeth. The feeling of warmth soon disappears, but the numbness and tingling of the lips and fingers continue for a period varying from one to three

hours. Slight muscular weakness is generally experienced, with indisposition for exertion either mental or corporeal. In about half an hour more, the pulse is found to be diminished in strength; and in another hour, both the pulse and the respiration have become less frequent. Thus, a pulse which, in the normal state, beats seventy-two in the minute, will, by that time, have fallen to about sixty-four, and the respirations, supposing them to have been eighteen, to fifteen or sixteen.

Second Degree of Operation.—Should a dose of ten minims be given at first, or the first dose of five minims be succeeded in two hours by another of equal amount, these symptoms supervene more rapidly, and with greater severity. The tingling extends along the arms, and the sensibility of the surface is more or less impaired. In an hour and a half, the pulse will probably have fallen to about fifty-six beats in the minute, and become smaller and weaker than before, still maintaining, however, perfect regularity. The respirations will have diminished to about thirteen, presenting, at the same time, a slow labouring character. Great muscular debility is now experienced; and giddiness, with confusion of sight, comes on when the erect posture is assumed. The individual sinks into a lethargic condition, evinces great disinclination to be disturbed, although he rarely falls asleep, and complains much of chilliness, particularly in the extremities, which are cold to the touch. These phenomena continue in their full intensity from three to five hours,

when they gradually disappear, a sensation of languor which lasts for several hours more alone remaining.

This is the utmost extent to which I would recommend the physiological effects of Aconite to be carried, in order to obtain, with safety and success, its therapeutic action.

Third Degree of Operation.—On the administration of five minims more, two hours subsequent to the last dose, the sense of warmth, and the numbness and tingling, again spread rapidly over the body. The sensibility of the surface is still farther diminished; lancinating pains in the joints are occasionally complained of; the headache, vertigo, and dimness of vision, are aggravated; the countenance grows pale and anxious; the muscular feebleness increases; the voice becomes weak, and the individual is frequently impressed with the dread of approaching dissolution. Occasionally, the pulse is reduced still further in strength and frequency, perhaps falling to 40, or even 36 beats per minute, but still maintaining its regularity. More frequently, however, it rises to 70 or 80, and becomes small, weak, and probably more or less irregular. The respiratory movements are also irregular, being either short and hurried, or deep and sighing. The surface is moist, and still farther reduced in temperature. Sickness may now come on; and, if formerly present, is much aggravated, and probably attended by vomiting. These symptoms do not entirely subside for one or two days.

Fourth Degree of Operation.—If the administration

be carried further, the symptoms assume a more alarming character. The countenance becomes pale and sunken; froth issues from the mouth, and the prostration increases. Two patients thus affected stated, that they felt as if dying from excessive loss of blood. Consciousness usually remains; or there may be slight wandering delirium, as occurs also after profuse hæmorrhage. The voice is whispering, or is altogether lost. The pulse becomes still smaller, weaker, and more irregular; and the breathing more imperfect. The surface is colder than before, and is covered with a clammy sweat.*

When the action of the drug is carried to a fatal extent, the individual becomes entirely blind, deaf, and speechless. He either retains his consciousness to the last, or is affected with slight wandering delirium; the pupils are dilated; general muscular tremors, or even slight convulsions, supervene; the pulse becomes imperceptible, both at the wrist and heart; the temperature of the surface sinks still lower than before; and at length, after a few hurried gasps, death by *syncope* takes place.

* The effects detailed in the above paragraph are derived from four cases in which they occurred accidentally. In one of these the symptoms supervened prematurely, a circumstance to be attributed to the peculiar idiosyncrasy of the patient; in another they were induced by an error on the part of the attendant (see Appendix, Part II., Case IV., report of December 21); and in the remaining two were brought on by the patients themselves, who, in their anxiety to obtain complete relief from severe pain, took more of the medicine than was prescribed (see Appendix, Part III., Case VIII.) The bad symptoms in all these cases were removed by appropriate remedies, and the patients recovered. The train of symptoms characterising the action of the drug when carried to a fatal extent, is derived from the published cases of poisoning, and is introduced to complete the view of its physiological effects, and to shew forcibly its peculiar depressing agency on the heart.

It must be borne in mind, that these symptoms do not, on all occasions, occur in the uniform manner in which they have now been described. On the other hand, some of them may be entirely absent; while others not yet mentioned, but to which I shall afterwards allude, may appear. In some cases, also, great insensibility to the influence of the remedy is manifested.

In administering it, it is proper to begin with a small dose, which must be increased or repeated, until the physiological effects of the drug, of the intensity described under the second degree of operation, have been produced.

I now proceed to treat, in detail, of the effects of Aconite on the different systems of organs :—

I.—On the Cerebro-Spinal System.

Aconite, in all doses, exerts a remote action on the nervous system, and this it does in three ways.

1. *Primarily,—by its direct or specific action when conveyed to it by the blood.*—This is purely *sedative* in its nature from the first, and the closest scrutiny fails to detect any symptom calculated to warrant the belief that a primary stimulant action is exerted. It is indicated by general depression of the mental powers; the individual being languid, and unwilling to be disturbed or annoyed by questions; and also by diminished sensibility. Thus the common sensibility of the whole surface is impaired; there are more or less dimness and

confusion of sight; sometimes total blindness; and slight deafness occasionally exists. I may remark, as not unworthy of notice, that I have seen the sense of touch considerably blunted; although the patient was capable of appreciating slight differences of temperature.

The numbness and tingling, so characteristic of the action of Aconite, must be looked upon as indicative of a sedative action on the nerves, as is evident from their appearing, in all cases, in common with diminished sensibility. Previously to their becoming general, these sensations are frequently experienced in parts, the nervous or vascular action of which is excited,—as a rheumatic joint or a neuralgic limb.

2. *Secondarily,—by its sedative action on the circulation.*—When this is fully developed, the flow of arterial blood to the brain is much diminished; an occurrence which impairs the energies of that organ, in the same way as *excessive loss of blood;* between which, and the action of Aconite, there exists a very strong analogy. This state of the brain, doubtless, gives rise to the vertigo, tinnitus aurium, headache, and slight confusion of mind, which occasionally occur; in proof of which I may state: *first*, That they are never observed until the depression of the circulation has been carried to a considerable extent—their severity always bearing an exact relation to the amount of that depression. *Secondly*, That they are much aggravated by the erect posture; and, *lastly*, That they bear a strong resem-

blance, in their character and order of succession, to the same symptoms, when brought on by excessive loss of blood. Some of those symptoms, which we have already noticed, as being produced by a direct agency on the nervous system, such as diminished sensibility of the surface, slight deafness, and impaired vision, may also be attributed, in part, to the same cause.

3. *Aconite acts on the Brain and Spinal Cord: —Secondarily*, by producing *engorgement of their venous system.* This mode of action is never developed but when poisonous doses are given, and I only mention it at present, for the sake of method. The engorgement of the nervous centres is a part of the general venous congestion, consequent on the difficulty of breathing.*

In consequence of the powerfully sedative action of Aconite on the brain, languor and inaptitude for exertion, either of mind or body, are, as has been already stated, induced. In some cases, this condition is accompanied by slight disposition to sleep; but this is so trifling, as not to warrant me in ascribing to the drug a distinct hypnotic action. It may, however, induce sleep indirectly, by virtue of its anodyne properties, in cases where the patient is only prevented from enjoying it by the severity of his sufferings.

A *burning heat* in the mouth, throat, and stomach, is

* See Action in Poisonous Doses.

frequently complained of, when large doses have been taken. This sensation is entirely nervous; in proof of which it may be stated, that in those cases of poisoning which do not prove fatal, it rapidly disappears. I have also distinctly ascertained, that both the feeling of general warmth of the surface which follows the internal administration of the drug, and the sense of heat produced in the skin by the external application of its alkaloid, are unaccompanied by any actual increase in temperature or mark of excited vascular action.

The sense of swelling or distention, already noticed as being felt in the lips and tongue, often extends over the face and to different parts of the body.

Some patients complain of a feeling of *weight*, as if a heavy load were resting on the abdomen, and bearing them down to the bed. I have met with this peculiar symptom in five cases. In all of these it seemed to resemble closely the feeling of oppression experienced in night-mare, and may possibly be owing to the same pathological cause. Dr Williams ascribes night-mare to congestion of the right side of the heart from accumulation of blood in the venous system, in consequence of a weakened state of the circulation;* and in all the cases in which this symptom was observed, the pulse was, at the same time, much reduced, and a similar state of congestion must consequently have existed.

* Cyclopædia of Practical Medicine, vol. ii. p. 607.

A sense of *constriction in the throat* and difficulty of swallowing are not unfrequently experienced in cases of poisoning by Aconite, although they rarely follow its administration in small doses. Slight uneasiness in deglutition, however, with tickling in the throat, is very common in the latter class of cases; being apparently topical effects of the medicine, produced in the act of swallowing.

II. On the Muscular System.

The action of Aconite on the muscular system is *directly and powerfully sedative.* In the second degree of operation, the patient complains of general weakness, which, in the third, may advance to a feeling of complete prostration. When this is excessive, it may be accompanied by partial or complete loss of voice. Muscular tremors and nervous twitches of the limbs are sometimes, though rarely, observed. The muscular debility endures for a period, varying, according to its intensity, from a few hours to several days.

From the preceding statements as to the effects of Aconite on the cerebro-spinal and muscular systems, the following practical inferences may be drawn :—

1. That it is calmative, anodyne, and antispasmodic.
2. That it is an advisable antiphlogistic in apoplexy,

phrenitis, or any disease in which the circulation of the brain is excited.

3. That it is contra-indicated in headache, arising from anæmia, or chlorosis, and wherever there is a torpid or paralytic condition of the muscular system.
4. Its properties suggest its employment in convulsive or spasmodic diseases.

III. On the Vascular System.

Aconite exerts a *direct sedative* influence on the vascular system, reducing, more or less, according to the dose administered, the strength, volume, and, in the first instance, the frequency of the pulse. The diminution in frequency varies much, *cæteris paribus*, with the individual; the pulse, in some cases, not falling below 60, and, in others, sinking so low as 48, 40, and even 36. As a general rule, it maintains its regularity as long as it continues to become slower. On the sedative action being carried further, it rises in frequency, becomes irregular and intermittent, and still smaller and weaker. Its character is then frequently most remarkable. It may present, *first*, irregularity in point of strength and volume. An ordinary beat, of moderate size, may alternate with a small, almost imperceptible, pulsation, such as is observed in some cases of heart disease; the pulse, at the same time, not presenting any

irregularity in point of rhythm. *Secondly*, It may be simply intermittent, the pulsations not differing from each other in strength and volume. One of these intermissions may last for several seconds.* In one instance, I repeatedly observed no less than ten seconds to elapse without any perceptible pulsation at the wrist. *Thirdly*, More frequently the pulse is irregular, both in point of rhythm and strength. Thus a pulse which, for three, four, or more beats, is weak but regular, of moderate size, and beating at the rate of 36 or 40 per minute, may suddenly become much smaller and weaker, and rise to 120. After fifteen or twenty pulsations more, its character may again change, and, for the next few seconds, a full and soft beat may alternate with a nearly imperceptible one. In a short time, it may become intermittent, only to resume, in another minute, one of the characters already described. I have observed the pulse continue in this anomalous condition for one or two hours, after every other symptom of the action of the drug had disappeared. It sometimes presents, in a very marked degree, the character described by the term *labouring*, in which case its beat suggests very forcibly the idea that the heart is suffering from some depressing influence. Each contraction appears to be performed slowly and with difficulty, and the artery may positively be felt distending tardily under the finger. In such cases, the cardiac sounds, as heard by the

* See Appendix, Part First, Case x., Report of January 25, eight, P.M.

stethoscope, are weak and indistinct. When, on the other hand, the pulse is quick, irregular, and intermittent, they are confused and interrupted, as if many of the contractions of the heart were imperfectly performed.

To prove, beyond doubt, that the sedative effect exerted on the circulation is direct, I have frequently examined the pulse, every five or ten minutes, for one or two hours after the exhibition of a dose. In general, the first perceptible change was a diminution of strength, and, in a few cases, of frequency; but in no instance did I observe the slightest tendency to primary excitement.

We must regard the rising of the pulse, after it has fallen to a certain standard, merely as an indication of increasing debility, and as the effect of an effort, on the part of the heart, to compensate for diminished power by increased frequency; while the irregularity and intermissions which follow, are evidently the result of the inability of the organ to maintain steadily this augmented frequency.

If only two or three doses have been given, the heart recovers itself in a period varying from twelve to twenty-four hours. If, on the other hand, the administration of the drug has been continued for a week or more, several days elapse before it does so; shortly after which event, I have generally observed that the pulse becomes somewhat quicker and fuller than natural; in short, a slight degree of *reaction* is established—an occurrence

which we know almost invariably succeeds depression of the circulation from other causes, as loss of blood, cold, shock to the nervous system, &c. In one instance, this state was indicated not only by elevation of the pulse, but by slight headache, and heat and dryness of the skin.*

The effect of *change of posture* on the pulse of individuals influenced by Aconite, may be stated as follows: —Supposing the pulse, under the first degree of operation, to be 64 while the patient is in bed, it will rise, on his assuming the erect posture, to 70 or 80, becoming, at the same time, smaller and weaker. Should the second degree of operation have been induced, lowering it to 56, it will rise, on a similar change of posture being made, to 80 or 90, become much smaller and weaker, and perhaps present an irregular character. If, in the third degree of operation, the patient attempt to rise, he will probably fall back in a fainting state. The influence of change of position thus seems to increase in the ratio of the depression which has been induced.

I may take this opportunity of stating, that patients under Aconite ought to be cautioned against any sudden change of position, which may, when the circulation is very much weakened, as in the third or fourth degree of operation, lead to dangerous syncope.

In addition to its direct sedative effect, Aconite acts

* See Appendix, Part II., Case xvii.; reports of January 20th and 21st.

on the circulation, secondarily, by producing congestion of the venous system. This condition follows any tendency to difficulty of breathing, and is most marked when death takes place by asphyxia. Its effect on the symptoms is stated in the section treating of the action of Aconite in poisonous doses.

Aconite may operate upon the heart, 1. *Primarily*, by direct application to its inner surface, when conveyed to it with the blood. That its muscular power is enfeebled in this way, is rendered highly probable by Experiment 25,* where the muriate of Aconitina was introduced into its cavity, with the effect of rapidly arresting the contractions of the organ. 2. *Primarily*, when conveyed into its tissue by means of the coronary arteries, in which way also a direct paralyzing influence may be supposed to be exerted. To shew that the sedative action of the remedy on the vascular system is quite independent of its action on the nervous system, I may mention, that I have frequently observed a decided change, both in the strength and frequency of the pulse, before any symptom of the action of the drug on the nervous system was apparent; but there is every reason to believe, from the intimate connection of the heart, through the ganglionic nerves, with the cerebro-spinal system, that the latter, when affected, will react upon the former.

* See Appendix, Part I.

I am convinced, that it is equally independent of the nausea which Aconite frequently excites, having repeatedly seen the pulse reduced even to the extent described under the third degree of operation, without the slightest nausea having been produced.

In examining the pulse of individuals labouring under the effects of Aconite, the greatest care is requisite, as the lapse of a few minutes, or a change of posture, may alter its character. Hence, in all my observations on this subject, the patient was in the recumbent posture, and the frequency, strength, and volume of the pulse, were estimated from repeated examinations. It is proper to continue counting it for three or four minutes, as it is frequently accelerated at first, especially in females, by the approach of the medical man to the bed.

Practical Inferences, deducible from a consideration of the action of Aconite on the Circulation.

1. That it is a powerful antiphlogistic.
2. That it is calculated to be of great value in all cases, when there is inordinate activity of the circulation.
3. That it is contra-indicated, when there is obvious mechanical impediment to the passage of the blood, particularly through the heart or lungs. It is requisite, therefore, in every case, to ascertain that

no such obstruction exists before commencing its use.

4. That it is contra-indicated whenever there is irritability of the circulation, with great diminution of power, such as occurs after severe hæmorrhage.

IV. On the Respiratory System.

In every case in which I inquired into the frequency of the respirations, I found them diminished, and that in proportion to the amount of the drug administered. That there was some relation between the effect produced on the pulse, and that on the respirations, appeared from their diminution in frequency, proceeding in nearly the same ratio. When the pulse becomes rapid, irregular, small, and weak, this relation is entirely destroyed. The breathing, then, either continues slow, or becomes slightly irregular, a few short and imperfect respirations being now and then succeeded by a deep sigh.

The diminution in the frequency of the respiratory movements may be attributed to one or more of three causes. 1. To a nearly general law in physiology and pathology, that, within certain limits, the respirations bear a more or less close relation, in point of frequency, (1 to $4\frac{1}{2}$ or 5) to the heart's pulsations. 2. To the diminished sensibility of the lining membrane of the

lungs, in consequence of which the impression of venous blood in their tissue, or of carbonic acid in the air-cells, is more sluggishly conveyed to the brain. 3. To the impaired energy of the respiratory muscles.

Practical Inferences.

1. Aconite will probably be found a highly advantageous antiphlogistic in pneumonia, pleuritis, &c.
2. It seems calculated to be serviceable in spasmodic asthma.
3. It is contra-indicated in difficulty of breathing, arising from any other cause than inflammation or spasm.
4. In cases of advanced bronchitis, with excess of secretion, it would prove highly injurious, by diminishing still further the power of expectoration.

V. On the Alimentary Canal.

The first sensation usually experienced after taking a dose of Aconite, is, as formerly stated, an agreeable warmth in the mouth and stomach. In some cases, the first few doses excite nausea, and perhaps vomiting, which, however, soon cease, the stomach becoming habituated to its use; occasionally there is slight thirst. The tongue remains perfectly clean; no action whatever

is exerted on the bowels; and the use of the medicine may be continued for many weeks without impairment of the appetite.

VI. On the Secerning System.

Aconite does not act powerfully upon any of the secreting organs; and what influence it does exert upon them, seems entirely attributable to its sedative effect on the vascular and nervous systems.

Cutaneous Secretion.—In ten of forty-three cases, in which I have watched its action, it produced a decided sudorific effect. All of these belonged to the non-inflammatory class of diseases, or were healthy individuals. An explanation of this fact seems to be found in the theory of its action on the secerning system, just mentioned; for, in the *non-inflammatory* cases, the sedative action of the remedy was usually carried to a much greater extent than in the *inflammatory* cases, in which it was generally discontinued after the disease had abated.

This view is confirmed by the experience of Dr Lombard, who states that of ten cases of articular rheumatism, treated by him with this drug, in one only did diaphoresis occur; while, in another, sweatings which had lasted for fifteen days, were arrested. He rarely continued the administration of the medicine for any length of time after the removal of the disease, and never carried its

sedative action to a great extent. The sweatings, which were suddenly checked, seem to have been a mere symptom of the disease, disappearing, as might have been expected, on its removal.

I may further observe, that diaphoresis rarely occurs until the circulation has been depressed to a considerable extent; and that it is almost invariably present in cases of poisoning by Aconite. The action of this remedy on the secretion of the skin is, therefore, similar to that of fear, and other depressing passions, venesection, &c.

On the Urinary Secretion.—I made a series of careful observations as to the quantity of urine passed daily by individuals under the influence of Aconite, and met with diuresis, and that slight, only in two cases; but from the variation in amount which that fluid undergoes in a state of health, from accidental causes, some doubt may be entertained as to how far its increase was, in these instances, to be ascribed to the action of the drug.

Cumulative Action.

I have not met with any convincing evidence that Aconite is a cumulative remedy. In two cases, however, symptoms presented themselves which induce me to suspect that it is so. The individuals were affected with general tremors, severe pain in the head and eyeballs, constant lachrymation, intense photophobia, heat of skin,

quick pulse, and great restlessness,—symptoms which, while very different from those ordinarily produced by Aconite, still were distinctly attributable to its continued use.* In many other instances, where the administration of the remedy was continued for weeks, or even months, no such effects were observed.

In the cases referred to,† the medicine being discontinued, the symptoms, which were by no means alarming, disappeared in a day or two.

Division III.—*In Large and Poisonous Doses.*

Aconite is a *direct sedative poison.* According to the amount of the dose, and consequent rapidity with which the fatal result ensues, we observe three varieties in the symptoms and mode of death.

First, It may prove fatal by a *powerfully sedative impression on the nervous system.*

In Experiments 20 and 21, this was evidently the cause of the fatal termination, which could not have taken place by asphyxia, seeing that life ceased after *a few seconds;* and it is known that animals can sustain complete suspension of the breathing, for at least three minutes, without deprivation of life; and it could not have

* The symptoms resemble somewhat those of delirium tremens.

† See Appendix, Part II., Cases xv.; and xvii., reports of January 12 and 13.

occurred by syncope, as in Experiment 21 the action of the heart continued for some time after death.

The symptoms observed in this mode of death, are—general insensibility, sudden and complete paralysis and flaccidity of the muscles, immediate dilatation of the pupil, and a fixed and opalescent appearance of the eye-ball. Perhaps the most conclusive evidence of death is the circumstance, that winking no longer follows irritation of the cornea.

Secondly, It may prove fatal by *suspension of the respiratory function.*

When the dose is large, and death ensues *in a short time, as within an hour*, paralysis of the muscles of respiration is produced, and ultimately complete asphyxia comes on. Consciousness appears to remain as long as the animal possesses sufficient sensation and volition to enable him to express it. On opening the bodies of animals killed in this way immediately after death, the heart is found beating with considerable force, which it continues to do for many minutes. The post-mortem appearances of death by asphyxia, viz., engorgement of the right side of the heart, and great veins leading to it, with general venous congestion, are present, and a small quantity of dark coloured blood is usually found in the left side of the heart.

This mode of death has never, as far as I know, been recognised in man ; the quantity of the poison taken, in no case having been sufficient to exert such an effect on

the nervous and muscular systems as is necessary to induce it. For an account of the symptoms which characterize it, I must, therefore, refer to the section treating of the physiological action of Aconite on animals. It is not to be supposed that, in such cases, the circulation is not affected. There is always more or less depression of the heart's action, which, provided the asphyxia did not anticipate it, would ultimately proceed to a fatal extent.

Thirdly, Aconite may prove fatal by *syncope*.

This seems to have been the mode of death in all the well-authenticated cases of poisoning in man, in which the fatal result was generally *protracted for some hours*. The symptoms characteristic of it were described when the action of the drug in small and repeated doses was under consideration. *One dose*, sufficiently large to produce death in this way, excites, in the first place, numbness and burning heat in the mouth, throat, and stomach; then sickness and vomiting, with pain and tenderness of the epigastrium; the numbness and prickling speedily become general; there are diminished sensibility of the surface, vertigo, dimness of vision, or complete blindness, tinnitus aurium, and occasionally deafness; frothing at the mouth; sense of constriction in the throat, with sensations of weight, and enlargement of various parts of the body, but especially of the face and ears; great muscular feebleness, with general trembling; more or less difficulty of breathing, and speechlessness; a distressing sense of sinking at the

pit of the stomach, and dread of approaching death; the pulse becomes small, feeble, irregular, and finally imperceptible both at the wrist and heart; the extremities, and afterwards the whole body, become cold, and a clammy sweat bedews the surface; finally, the countenance grows blanched, the lips bloodless, and, with a few hurried gasps, the individual expires. He usually retains perfect possession of his mental faculties to the last, and exhibits no tendency to sleep; or there may be slight wandering delirium.

The fatal result is often sudden, as it frequently is in hæmorrhage, or disease of the heart. It occurs, according to the amount of the poison taken, in from one and a half to eight hours. Should an individual, who has taken a poisonous dose, survive the latter period, he will probably recover.

Appearances on dissection.—General venous congestion, to a greater or less extent, has, for the most part, been found. In some instances, there were engorgement of the brain and cerebral membranes, and considerable sub-arachnoid effusion. In the cases recorded by Pallas,* Degland, and Dr Geoghegan,† evidences of gastro-intestinal inflammation were also present.

It is not to be expected that, in every case of death by

* Thèse Inaugurale, Paris, 1822, quoted by Orfila, Toxicologie, 1843, ii., 359.

† See Appendix, Part III. Cases of Poisoning, iv. and v.

the two last modes of poisoning, all the symptoms are referable either to asphyxia or to syncope. These conditions are always more or less conjoined; but the more rapidly death ensues, the more purely does it take place in the way of asphyxia, and *vice versa*.

Several symptoms still remain to be considered, which, though not uniform in their occurrence, are, from their importance, worthy of notice. Some of these are mentioned by the older authors; but the cases reported by them are so meagre in point of detail, and the terms they use so inaccurately applied, as almost to prevent our attaching any weight to their statements. Doubts also may be justly entertained as to the A. Napellus having been the species employed; the resemblance between it and the other species of Aconite, as well as other members of the order Ranunculaceæ, such as Delphinium, being so close, as doubtless to have led to frequent mistakes. This remark applies especially to those cases described prior to the time when the advanced state of Botany had given precision to the characters of plants.

Convulsions, or slight spasmodic action, not unfrequently occur, apparently the effect of *cerebral venous congestion* consequent on dyspnœa. I am led to ascribe them to this condition, *first*, because they were preceded by much difficulty of breathing; and, *secondly*, because, in the cases where convulsions were present during life, dissection revealed congestion of the brain and its membranes.

To the same cause we may also attribute *stupor*, which

occurs but rarely; *apoplexy*, which is said to have ensued in a case recorded by Mathiolus;* and *contraction of the pupil.* That the last of these symptoms is not the effect of any specific action of the poison on the pupil, seems probable, for the reasons advanced when discussing the cause of the same phenomenon as developed in animals, strengthened by the fact, that, in Mr Sherwin's case,† it disappeared after the jugular vein was opened.

In several cases of poisoning,‡ and in four cases§ which came under my own observation, where the action of the drug in medicinal doses was accidentally carried to a somewhat dangerous extent, *dilatation of the pupil*, accompanied by almost total blindness, took place. Whether this symptom is to be regarded as the effect of the paralysis of the retina, or as indicating a specific action of the drug on the iris, it is difficult to determine.

Violent delirium, mania, and idiocy, are spoken of by some older authors;‖ but, for the reasons already assigned, their statements seem unworthy of confidence. It is possible, however, that such affections may supervene, either in consequence of the powerfully sedative action of the poison on the brain, in the same way as they are occasionally produced by the depressing passions, or of

* Comment. on Dioscorid.

† See Appendix, Part III., Cases of Poisoning, ii.

‡ See Appendix, Part III., Cases of Poisoning, vi., vii., and ix.

§ See Appendix, Part II., Case iv.; Report of December 21.

‖ Vicat, Hist. des Plantes Venen. de la Suisse, p. 8; Murray Apparat. Medicam.; Willis, De Anima Brutorum, p. 289, &c.

great deficiency in the amount of arterial blood circulating within the cranium; just as delirium and mania sometimes follow excessive hæmorrhage.

I have never seen the slightest reason for suspecting Aconite to be capable of exerting an irritant action on the alimentary canal, and in the greater number of the cases of poisoning now on record, no symptoms presented themselves calculated to warrant the belief that it does so. Pallas, Degland, and Dr Geoghegan, state that, in the cases of poisoning which they have recorded, marks of inflammation in the stomach and intestines were present. The circumstance, however, that, in the great majority of cases, no such appearances have been observed, justifies the suspicion, that, in those instances, either some irritating substance was taken into the stomach along with, or after, the poison; or that the latter was not the root of Monkshood, but that of some other plant, there being several members of the Ranunculaceæ which bear a close resemblance to the Aconite, and might, particularly in spring, be readily mistaken for it.

In the cases cited by Pallas and Degland, no mention is made of numbness or tingling, as part of the symptoms; and the poisonous tincture found in the stomach after death, in the cases recorded by the latter, which is described as having had a nauseous taste, is not said to have produced the numbness and tingling so characteristic of the topical application of Aconite to the lips and

tongue, and which, had they been experienced, were not likely to pass unnoticed.

The severe and constant vomiting produced by it, is not to be regarded as indicating an irritant action, seeing that it may result from any impression, sedative or stimulant, made on the gastric nerves, sufficient to excite the reflex action concerned in the process. When long continued, however, we can easily conceive it capable of exciting such irritation in the lining membrane of the stomach as might cause that organ to present, after death, appearances simulating those of inflammation; nor can we have any hesitation in attributing to the same cause, the pain and tenderness of the epigastrium complained of,—symptoms evidently seated in the abdominal muscles, and only felt when the vomiting has been going on for some time, and disappearing on its cessation.

Dr Christison, in the last edition of his work on Poisons (page 873), states that, in two cases, he was deterred from proceeding with the use of the extract of the root, in consequence of the griping and diarrhœa which it produced. Such an effect, however, from its great rarity, can only be regarded as idiosyncratic; and we can easily understand that the same local nervous impression which, in the mouth, increases the flow of saliva, may, in the intestinal canal, under particular circumstances, so augment the mucous secretion, as to cause diarrhœa. It is evident that such an occurrence is more likely to ensue from the use

of the extract than of the tincture, as the former, from its more tardy absorption, will come in contact with a greater extent of the intestinal mucous surface.

In cases of poisoning the symptoms may commence in a few minutes, or not for one or two hours, according to the nature of the preparation, and the state of the stomach with regard to food; thus, in a case of poisoning, from the tincture of the root, which I have narrated,* they appeared in a few minutes; whereas, in the case recorded by Mr Pereira,† no unpleasant sensation was experienced for three quarters of an hour. In the latter instance, the root was the part of the plant taken; which circumstance, viewed in connection with the fact that food was present in the stomach at the time, fully accounts for the slow absorption of the poison.

Two or three drachms of the root, or less than one drachm of the tincture, are sufficient to cause death. Four grains of the alcoholic extract have proved fatal, and two grains have produced the most alarming symptoms.

* See Appendix, Part III., Cases of Poisoning, viii.

† See Appendix, Cases of Poisoning, i.

Division IV.—*Modus Operandi.*

I am of opinion that Aconite acts solely by direct transmission with the blood to the part affected.

In the *first* place, that the poison is absorbed, is proved by its disappearance from a serous cavity, or other situation into which it has been introduced, as shewn in the experiments on animals.

Secondly, That its remote effects are dependent on its absorption, is evident, from the following facts :—

1. The rapidity and intensity of its remote action are in proportion to the absorbing powers of the part to which it is applied, as also to the facility with which the preparation employed is capable of being absorbed.

2. No remote effects are produced when it is applied to a surface, such as the skin, where, from the presence of the cuticle, little absorption can take place ; while, at the same time, its topical effects clearly indicate that the nerves of the part are under its influence.

It being thus manifest that the poison enters the blood-vessels prior to the development of its remote action, the question arises, does it then act "by being carried with the blood to the part on which it acts, or by producing on the inner membrane of the vessels a peculiar impression, which is conveyed along the nerves ?"*

* Christison on Poisons, Third Edition, p. 606.

That it operates in the former mode seems likely: —1. From the much greater rapidity and power with which it acts when introduced directly into a vein.

2. From the experiments of Müller,* Brodie,† Blake,‡ and others, which shew that a poisonous influence cannot be conducted through the nerves.

3. From the fact that a nervous system is not essential to the operation of the poison, as shewn by its action on vegetables in which no nervous system exists.

The rapidity with which, in some of the experiments, the remote effects were produced, as in poisoning by the Muriate of Aconitina, or in the case of the injection of the poison into a vein,§ does not militate against this view, Mr Blake having shewn that a poison may pass from the jugular vein to the carotid artery in seven seconds in the dog, and four in the rabbit.

The *modus operandi* of Aconite on the various functions was considered in the division treating of its action in small doses.

From the observations made there, and in other parts of this inquiry, it is evident that its agency, either as a medicine or a poison, is not simple, and directed solely to one organ or system of organs, but complex, and

* Müller's Physiology, by Baly, i., p. 631.

† London Philosoph. Transact., 1811, p. 178.

‡ Edin. Med. and Surg. Journal, liii., p. 46.

§ See Appendix, Part I., Experiments 20 and 21.

directed to many organs, acting on these in various ways, and causing death in different modes, according to the amount of the dose or its mode of application.

Division V.—*Treatment of Poisoning by the A. Napellus.*

Provided vomiting to a sufficient extent has not already been excited as an effect of the poison itself, an emetic must at once be administered. If a sufficient time have elapsed for the poison to have reached the intestinal tube, a cathartic ought then to be given, and followed up, if necessary, by purgative injections.

Tannic acid, from its power of forming insoluble compounds with the vegetable alkaloids, may be expected to be useful in neutralising the poison. The experiments on rabbits formerly noticed,* shew that the gastric juice of these animals possesses a similar property. An infusion of the stomach of the rabbit, and probably of certain other herbivorous animals, might, therefore, be serviceable in poisoning by Aconite, although, from the length of time which it requires to act, this is more than doubtful.

* See page 14.

In order to combat the *remote effects* of the poison, which have been shewn to be powerfully sedative, a *stimulant* line of treatment must be rigidly enforced. Brandy and hot water, with ammonia, will be found most efficacious. Strong coffee has also been used with decided advantage. From my own observation, I am of opinion that great benefit is to be derived from friction with warm cloths and spiritous liniments, especially along the course of the spine and on the extremities. By thus stimulating the capillaries, the heart's action seems to be materially assisted. Sinapisms, or bottles of hot water, should also be applied to the præcordia and extremities.

Should convulsions come on, the jugular vein ought to be opened, and a moderate quantity of blood withdrawn. By this means not only will the congestion of the brain be removed, but relief will be afforded to the heart, the right side of which is, in such cases, much engorged.

Where there is much dyspnœa recourse may be had to artificial respiration, which will be of service not only in maintaining the function of the lungs, but also in contributing to keep up the action of the heart, and thus diminishing the tendency to syncope.

When the action of the heart is becoming very feeble, the effect of slight galvanic shocks passed through it may be tried. In such cases, acupuncture of its walls has been recommended by Carraro.

SECTION FOURTH.

THERAPEUTIC ACTION OF THE ACONITUM NAPELLUS.

Sedative of the Nervous System—Anodyne.—Aconite may relieve pain, by diminishing the sensibility of the nerves without acting on the brain, as in the case of its topical action. It is probable, however, that, when given internally, it also has the effect of rendering the brain more or less insensible to impressions conveyed to it by the sensory nerves. There is another mode in which we may suppose it to act as a local anodyne, namely, by virtue of the general law in the physiology of the nervous system, that two impressions cannot be perceived at the same time with equal intensity. Thus, supposing the inferior dental nerve to be in a neuralgic condition, by establishing in the nerves of the skin above it a new sensation of a powerful kind, the brain may, for a time, cease to be cognisant of the morbid impression.

As an *anti-neuralgic*, its action is materially different from that of a mere anodyne, such as opium. It not only allays pain, but is capable of removing permanently the morbid condition of the nerve on which the pain depends. I have met with several cases of neuralgia, in which the individuals had, for weeks or months, been in the habit of procuring sleep, and a temporary cessation of pain, by opiate draughts, and who, on using the Aconite, obtained permanent relief from the disease.

The action of Aconite as a *calmative* in inordinate excitability, is readily explained, by its physiological effects on the nervous and vascular systems.

It may be expected to act as an *antispasmodic*; *firstly*, by virtue of its power of diminishing the sensibility of the nerves, and thereby removing that peculiar susceptibility to the impressions of exciting agents which is a frequent cause of spasmodic action; and, *secondly*, by producing muscular feebleness.

Sedative of the circulation—Antiphlogistic action.—An agent which can directly depress the circulation to the extent that I have shewn Aconite to be capable of doing, and which can sustain this action for any length of time, must be admitted to be a highly valuable member of the materia medica. The use of Aconite may be persevered in for weeks, leaving, on its being discontinued, scarcely any or no unpleasant effects; in this respect possessing a great superiority over venesection, mercury, purging, &c., which, while they remove the disease, debilitate the patient to a greater or less extent, and expose him to all the annoyances of a protracted convalescence. When blood-letting has been previously had recourse to, the susceptibility of the system to the action of Aconite is *increased*, and *smaller* doses than those generally given are sufficient to maintain the sedative effect already produced on the circulation by the loss of blood, and to render further depletion unnecessary. In erysipelas, rheumatism, and other inflammatory diseases, the benefit obtained from the use of Aconite is, no

doubt, chiefly attributable to its sedative effect on the circulation; although, in all likelihood, much of it is also owing to that produced on the nervous system.

The *diuretic* and *diaphoretic* properties of the drug are too feeble and uncertain to be made available in practice.

Its power of discussing scrofulous and syphilitic swellings, so strongly insisted on by Störck and others, is generally doubted, although its effects in promoting the absorption of fluid effused into the joints in synovial rheumatism, is sufficiently decided to render a more extensive trial of its virtues as a *deobstruent* advisable.

Division I.—*Neuralgia.*

Aconite has been employed in neuralgic pains, both internally and externally, with great success. Mr Pereira considers it superior to any other remedy in the treatment of neuralgic diseases. It has recently been much used by Jahn, Tealier, Hufeland, Spielman, Wildberg, Busse, &c.

I have drawn up in a tabular form the particulars of all the published cases in which it has been used by others, as well as of those occurring in my own practice, of which correct notes were preserved. The average duration of treatment in the *successful cases* is there shewn to have been six days.

TABLE OF CASES OF NEURALGIA.

Sex.	Age.	Seat of Disease.	Duration.	Nature of Treatment.	Duration of Treatment.	Result.
*Male, ...	40	Tic Douloureux, ...	8 years, ...	External application of the alkaloid, ...	8 days,	Permanent cure.
*Male, ...	...	Infra-maxillary nerve on both sides, ...	9 years, ...		6 days,	
†Female, ..	35	Neuralgia of hip-joint,	Upwards of a year, ...	External application of tincture, ...	...	Permanently cured by one application.
†Male, ...	70	Neuralgia infra-orbitalis,			...	
†Male, ...	40	Neuralgia supra-orbitalis,	.....		...	
‡Female, ..	17	Inner surface of ankle-joint, ...	2½ years, ...	External use of alkaloid,	...	
‡Male, ...	60	Neuralgia infra-orbitalis,	5 years, ...		15 days,	Permanent cure.
‡Male, ...	32	Middle finger of left hand,	2 years, ...	Internal use of tincture, conjoined with its external application,	31 days.	
‡Female, ..	62	Lumbago and Sciatica,	7 years, ...	External use of alkaloid,	8 days,	
‡Male, ...	32	Neuralgia supra-orbitalis,	4 years, ...	Internal use of alkaloid,	6 days,	
Female, ...	43	Neuralgia infra-orbitalis,	9 months, ...	External application of tincture, ...	9 days,	Temporary cure; disease returned in eight months.
Female, ...	45	Neuralgia infra-maxillaris,	7 months, ...	Tincture used both internally and externally,	13 days,	Permanent cure.
Female, ...	40	Neuralgia frontalis, ...	2 months, ...	External use of tincture,	3 days,	Temporary improvement.
Female, ...	...	Tic Douloureux, affecting the whole of left side of face, ...	Several years,		16 days,	Slight temporary relief after each application.
Female, ...	47	Neuralgia occipito-cervicalis, ...	Several months,		4 days,	Permanent cure.
Male, ...	...		Several years,		6 applica.	Relief for several hours after each application —disease not removed.
Female, ...	43	Hemicrania of left side,	3 weeks, ...		5 days,	Permanent cure.

* Mr Skey, in Medical Gazette, November 1836. † Dr Curtis, in Lancet, June 1841.

‡ Dr Turnbull, Treatise on Painful and Nervous Diseases, London, 1837.

TABLE OF CASES OF NEURALGIA—*continued.*

Sex.	Age.	Seat of Disease.	Duration.	Nature of Treatment.	Duration of Treatment.	Result.
Male, ...	32	Hemicrania of right side,	7 days, ...	External use of tincture,	2 applica.	Permanent cure.
Male, ...	26	Hemicrania of left side,	3 days, ...		3 applica.	
Female, ...	35	Neuralgia of the intercostal nerves below left mamma, ...	14 days, ...		2 days,	
Female, ...	27		3 days, ...		1 applica.	
Female, ...	21		3 weeks, ...		4 applica.	
Female, ...	...	Neuralgia of hand, ...	A few days, ...	Internal use of tincture,	3 days,	Permanent improvement, but cure not complete.
Female, ...	30	Neuralgia cruralis, ...	3 years, ...	External use of tincture,	8 days,	Permanent cure.
Male, ...	15	Post-febrile neuralgia of feet, ...	8 days, ...		4 days,	
Male, ...	45	Neuralgic stump, ...	4 years, ...	Internal use of tincture,	13 days,	Temporary benefit.
Male, ...	36	Neuralgia of ulnar nerve,	Several weeks,		3 days,	Permanent cure.
Female, ...	27	Severe neuralgia of thumb,	7 days, ...	External use of tincture,	4 applica.	
Female, ...	19		3 weeks, ...	Internal use of tincture,	4 days,	
Male, ...	28		2 months, ...	Tincture used both internally and externally,	10 days,	
Male, ...	33		7 weeks, ...		4 days,	
Male, ...	42		Several months,	Internal use of tincture,	16 days,	Only partial relief obtained.
Male, ...	...		2 months, ...		12 days,	Permanent cure.
Female, ...	...		Several weeks,		5 days,	
Female, ...	29		1 week, ...		3 days,	
Male, ...	28		5 weeks, ...		10 days,	
Male, ...	47		Several years,		19 days,	Only partial relief obtained.
Male, ...	50	Sciatica, ...	18 months, ...	Tincture used both internally and externally,	14 days,	No improvement, with the exception of transient relief which he enjoyed after each dose.
Male, ...	23		Several months,	Internal use of tincture,	9 days,	In both cases almost complete relief was obtained; but the pain afterwards returned, though with diminished severity. I had not another opportunity of using the Aconite.
Male, ...	34		3 weeks, ...		7 days,	

Many of these were cases of several years standing, of the most aggravated character, and in which the remedies usually had recourse to in neuralgia had been used with no other effect than that of affording temporary abatement of the pain. It is true that the same favourable results are not always obtained,—Drs Copland, A. T. Thompson, and others, having used it in several cases without success; while the table will shew that it has, more than once, in my own hands, failed to effect a cure. It may readily be supposed that more benefit will be obtained in those cases of neuralgic disease, which are purely dynamic, or of inflammatory origin, than where the affection is dependent on some organic lesion, as pressure of diseased bone, or thickening of the neurilemma, in which cases it is evident that temporary relief only can be afforded.

Pereira, Copland, Watson, Skey, and others, are of opinion that the external application of the remedy is more likely to be attended with success in neuralgia than its internal administration; while Hufeland, Busse, and Tealier, give a decided preference to the latter. The table shews that both occasionally succeed in the worst cases. Our selection of the mode of treatment must be guided, in a great measure, by the nature and cause of the affection, as far as they can be ascertained. Should it appear to be caused by inflammation, either in the painful part or in the nerve farther up in its course, or should it be traceable to sympathetic irritation, the internal use

of the remedy is more likely to be beneficial; if, on the other hand, it seem to arise from some local irritation applied to the nerve, or is merely functional, its topical application will probably be sufficient. In every case where the method of treatment adopted fails, the other should be had recourse to. It is hardly necessary to add, that in recommending Aconite in the treatment of neuralgic disorders, I would not have it used to the neglect of that due attention to the secretions and excretions which is indispensable for the successful application of any remedy.

Hemicrania.—I have found the external application of the tincture very effectual in the treatment of this affection, both where the pain affects a circumscribed portion of the head, and where it extends along the course of a nerve. For the sake of illustration I have detailed the particulars of one of these cases in the Appendix.* Dr Paterson, one of the Physicians to the Royal Infirmary, Edinburgh, informs me that he has, in the same manner, treated successfully a case of the former kind.

Tic Douloureux.—The credit of having introduced the topical use of Aconitina in the treatment of tic douloureux is due to Dr Turnbull, who found it extremely successful. His observations have been confirmed by Drs Roots and Sigmond, and Messrs Lyon, Skey, &c. M.

* See Appendix, Part II., Case xiii.

Roche found the internal administration of the extract very effectual, as also did MM. Delens, Jobert, and J'Allier.

I have had an opportunity of trying the former mode of treatment in four cases. One of these, which is reported in the Appendix,* that of a female, in whom the right *infra-maxillary* nerve had been affected for seven months, was completely cured in thirteen days. In the second case, one of great severity, and of several months' standing, a cure was obtained in nine days. The principal seat of the affection was the infra-orbital nerve of the right side.† The third was one of frontal neuralgia of the left side. The tincture was rubbed on the affected part twice daily, for three days, with decided benefit. The patient then left town, and I did not see her until six weeks afterwards, when the disease had returned. She would not make another trial of the remedy, as when formerly used it had produced partial blindness of the left eye. In the fourth case, which was of several years' continuance, slight temporary relief only was obtained. The whole right side of the face was affected.

Odontalgia.—I have found rubbing the gum around

* Part II., Case xi.

† It is now eight months since this case occurred, and I have just ascertained (May 1845), that the disease returned, though in a less severe form, four days ago. The Aconite was again resorted to, but no decided improvement has as yet been obtained.

the affected tooth with three or four drops of the tincture, and, when a carious cavity exists, the introduction into it of a piece of cotton soaked in a drop or two of the same preparation, very effectual in relieving toothache. Sometimes one application is sufficient for this purpose, in other instances two or more are requisite. In seven out of forty cases in which it was tried, it failed to give complete relief. In six it succeeded in doing so, but only for the time. In all the other cases, most of which I continued to observe for some weeks or months, complete and permanent relief was obtained. In several of these, creosote and other popular remedies had been used without success. Aconite is preferable to creosote, in as much as it does not, like the latter, act injuriously upon the teeth.

Otalgia may often be much relieved, or even entirely cured, by introducing into the external meatus a drop or two of the tincture, diluted with an equal quantity of water, or by rubbing the pure tincture briskly behind the ear.

Neuralgia of the Thoracic and Intercostal Nerves—Spinal Irritation.—I have found the topical application of the tincture extremely successful in the treatment of the neuralgic pains, so frequently complained of by females, as occurring about the seventh, eighth, and ninth ribs of the left side, as well as of *spinal irritation*, both when co-existing with, and independent of, these pains.

Neuralgia of the Extremities.—In a case of crural

neuralgia of the right side, where the pain was chiefly seated in a circumscribed spot on the inside of the patella, the external application of the tincture was, in eight days, followed by a complete cure. The disease, which occurred in a female of thirty years of age, was of three years' standing, and the part had been frequently leeched and blistered without effect—the potential cautery having been the only application which had afforded any relief. An interesting case of neuralgia of the feet, where the internal administration of the drug effected a complete cure, and one of neuralgic stump, in which much temporary relief was afforded by the same means, will be found in the Appendix. Dr Cormack has communicated to me a case of severe neuralgia of the right hand, which was at first treated successfully by the internal use of the tincture. The pain afterwards returned in two of the fingers, to a slight extent; but the patient could not be prevailed upon to resume the remedy, in consequence of its having formerly produced some dimness of vision.

Two cases of neuralgia of the fingers, in which the Aconite was had recourse to with success, are noticed in the Table of Neuralgic Cases.

Of twelve cases of *sciatica* in which I have used the Aconite, seven complete and two temporary cures were effected; two cases were partially relieved, and in one only was no benefit experienced. An analysis of these cases will be found in the table; and one of them is, for

the sake of illustration, detailed in the Appendix. As far as my own experience goes, I believe it will be found most useful in those cases of sciatica, which appear to owe their origin to a congested or inflammatory condition of the nerve.

The internal use of the extract in this disease, was, some years since, recommended by the late Dr Duncan.*

Angina Pectoris.—I have had no opportunity of trying the Aconite in this disease; but, from the statements as to its efficacy in *neuralgia of the heart*, made by Dr Copland,† as well as from its great utility in cardiac diseases generally, I have little doubt but that it will prove highly serviceable. Its internal administration is more likely to be beneficial than its application to the walls of the chest, in which way it has been employed by Copland.

In six cases of *gastralgia*, I have prescribed the following mixture:

℞	Tinct. Aconit. .	℥i.
	Carb. Sodæ, .	℥iss.
	Sulph. Magnesiæ,	ℨiss.
	Aq. . . .	ℨvi.

Of this a table-spoonful was ordered to be taken when the pain was urgent.

Immediate relief was generally afforded by each dose;

* New Edinburgh Dispensatory.

† Dict. of Prac. Med., ii. 893.

and in four of the cases a permanent cure was effected in a few days. The others were considerably improved, although they still continued subject to the malady.

Cephalalgia.

I have used Aconite internally, in fifteen cases of this affection, and in ten of these with complete success. Of these, three were cases of *nervous*, four of *plethoric*, and three of *rheumatic* headache. Of the unsuccessful cases, three belonged to the first class, and two to the dyspeptic variety. In the latter two cases, the appropriate remedies had been previously administered without effect.

Relief was usually experienced after the first dose, and a complete cure effected on the first or second day. In the cases thus successfully treated, there was no return of the complaint for several weeks, during which period the patients remained under my cognisance. Dr Burgess* and Mr Radley† state, that they have seen Aconite of incalculable service in relieving the agonizing pain of nervous headache; and Professors Henderson and Miller inform me, that they have employed it with marked benefit in the same disease. Störck and Vogel recommended it in rheumatic headache, while Dr Copland has found it useful in both varieties. In two of the cases of nervous headache, in which no relief was obtained

* Edin. Med. and Surg. Journal, 1840, p. 95.

† Lancet, 1836–37, ii.. p. 925.

by the internal use of the remedy, I tried its topical application to the temples and forehead, and in both instances with much benefit.

GENERAL PAINS OF FEVER.

I made numerous trials of the Aconite in this affection, in the epidemic fever which prevailed in this city during 1843-44, and which was characterised by the unusual severity of the attendant muscular and arthritic pains. These were frequently so intense, as to make the case simulate acute rheumatism, and to demand the administration of anodynes. I gave the tincture, in the dose of three minims, to be repeated in two hours if necessary. In a large proportion of cases, relief was felt within an hour after the first dose had been taken; and the few which were not benefited, would, I doubt not, have been so, had the dose been increased. This, however, I was unwilling to do, the great activity of the remedy calling for the most rigid caution in its administration, in a disease marked by such prostration of the vital powers as exists in fever. I applied the tincture externally in several cases, with decided benefit. I have also given it in the ordinary typhus of this city, when the pains were severe, and with equally favourable results.

Division II.—*In Diseases of the Heart, and Aneurism of the Large Vessels.*

In all those cases where the indication is clearly to diminish the action of the heart, Aconite is a most valuable remedy. In *functional derangement* it will often be found—in conjunction with appropriate treatment in respect to diet, regimen, &c.—equal to obtaining a complete cure. In *certain* cases of organic disease, its use is followed by great alleviation of the painful symptoms. There is a large class of cases, however, where sedative remedies are decidedly contra-indicated, but where, notwithstanding, they are too often recklessly administered. I refer to those conditions of the heart where, from some obstruction, that organ is unable to transmit the necessary quantity of blood by the usual number of pulsations, and is forced to make up for such inadequacy, by more frequent and forcible contractions. Here it is obvious that the effect of further reduction of its power would be such increased frequency, as would then be necessary to enable it to perform its task. In illustration of this, I may state that I have seen the administration of Aconite in such circumstances followed by augmented velocity, and a proportionate decrease of the force of the pulse. Where, however, it is really desirable to reduce the action of the heart, as in simple hypertrophy, functional disorder, &c., Aconite seems to be supe-

rior to digitalis, the remedy usually resorted to in such cases, and for the following reasons: Aconite is, from the first, a pure sedative, while the depressing effect of digitalis is alleged to be preceded by a stimulant action; and many bear testimony to the injurious effects arising from this primary excitement. Aconite acts much more uniformly than digitalis, which not unfrequently fails to produce the desired effect; while its primary stimulant action is said occasionally to continue, without being followed by depression. The former operates more rapidly, in the course of an hour or two, and its action can be maintained with safety by repeated small doses. It is usually, on the other hand, a day or two, or even longer, before the latter exerts any sedative influence on the heart, while there is always a risk attending its long-continued use, from its tendency to accumulate in the system.

In Aneurisms, accompanied with *neuralgic pains*.—I have administered Aconite in several cases of this nature, with marked alleviation of the patient's sufferings, partly attributable to its power as an anodyne, and partly to its sedative effect on the circulation, whereby the force with which the tumor presses against the surrounding nerves is diminished. Case ix. affords an excellent illustration of the second mode of action.* Professor Henderson has kindly furnished me with the particulars of a case of aortic aneurism, accompanied with severe neuralgic pains of the left side, in which great relief was afforded by the continued use of the tincture.

* See Appendix, Part II.

Division III.—*Acute Rheumatism.*

Aconite was first recommended in this disease by Störck, and has since been employed, with much success, by many German and Swedish physicians, as Stoller, Guerin, Gesner, Gmelin, Fritze, Murray, Rosenstein, Blom, Odhelius, Ribe, &c. More recently Drs Lombard and Sigmond have revived its use with the most encouraging results.

The annexed table, which is composed of my own cases, and all those recorded by others which I have met with, shews that the average period required to effect a cure under this treatment, is 5·6 days ;* the usual duration of the disease, under the ordinary treatment, being about a fortnight or three weeks.† In three instances, a complete cure was effected in two days ; in one, in three days ; and in six, in four days. The lowest averages of the duration of the treatment of acute rheumatism are, as far as I know, those furnished by Drs Hope and Corrigan, the former of whom found few cases which remained under treatment for more than a week ; while the latter, who treated the disease by opium, gives nine days as the average. The improvement following the administration of Aconite is often very speedy, some alleviation of the

* Not including the two cases of Synovial Rheumatism.

† See Macleod on Rheumatism, 1842, p. 154.

pains being occasionally experienced in the course of an hour after the first dose has been taken, while there are few cases in which decided relief, with abatement of the redness, tension, and tenderness, is not obtained in a few hours. A longer period seems to be required to disperse the inflammation in the smaller joints than in the larger ones.

The table also shews that in two only of all the cases did any affection of the heart supervene. In both of these instances, however, the disease had been detected prior to the administration of the Aconite. In one of them, the cardiac affection improved remarkably under its use. Bouillaud* on the other hand states, that in his practice, which was to bleed largely during the first five days, one half of the cases presented some cardiac complication; and Dr Macleod,† who also practised bleedings, though not to the same extent as the former, met with pericarditis in 52 out of 226 cases; that is, in nearly one fourth of the whole.‡ Thus, Aconite not only effects a cure in a shorter period than any other mode of treatment, but appears to possess the great negative advantage of not increasing the liability to extension of the disease to the membranes of the heart. Indeed, it seems rather to protect the patient from that dangerous complication.

* Nouvelles Recherches sur le Rheumatisme, &c.

† Op. cit. p. 154.

‡ See Alison, in Cyclop. Pract. Med., Hist. of Medicine, p. 95; Brit. and Foreign Med. Review, xiii., p. 453.

TABLE OF CASES OF ACUTE RHEUMATISM.

Sex.	Age.	Variety of Rheumatism, and Joints affected.	Duration of Disease previous to use of Aconite.	Duration of Treatment.	Remarks.
Male*.....	50	Rheumatic fever; left wrist and right shoulder,	2 days,	2 days,	No stiffness of joints left, and no disease of heart mentioned.
Female*...	52	Rheumatic fever; left shoulder,	21 days,	2 days,	
Male*.....	30	Rheumatic fever; ankles and knees,	10 days,	4 days,	
Female*...	30	Rheumatic fever, affecting nearly every joint in the body,	9 days,	7 days,	Stiffness remained in smaller articulations. No disease of heart.
Male*.....	30	Capsular rheumatism of right knee, with pains in the loins and shoulders,	6 weeks,	7 days,	Synovial effusion not entirely removed for some time. No disease of heart.
Female*...	59	Rheumatic fever, affecting all the joints,	3 days,	10 days,	Slight stiffness remained in articulations of hand. No disease of heart.
Male†.....	54	Rheumatic fever,	11 days,	8 days,	No disease of heart mentioned.
Male.....	40	Rheumatic fever, affecting all the joints of the left side,	7 days,	5 days,	Cardiac disease was present previous to the use of Aconite. It was improved.
Male.....	19	Rheumatic fever; shoulder, knee, and ankle joints,	28 days,	8 days,	No stiffness of joints remained.
Female.....	22	Rheumatic fever; knees, ankles, and right wrist,	21 days,	4 days,	In all these cases there was no affection of the heart; and in the greater number very slight stiffness of the joints was left.
Female.....	20	Rheumatic fever; knee, ankle, wrist, and finger joints,	5 days,	2 days,	
Female.....	20	Rheumatic fever; ankles, elbows, and wrists,	3 days,	9 days,	
Male.....	...	Rheumatic fever,	16 days,	4 days,	
Male.....	31	Rheumatic fever; ankle, knee, and hip joints,	9 days,	4 days,	
Male.....	28	Rheumatic fever; knee and ankle joints, with left elbow,	17 days,	8 days,	
Male.....	43	Rheumatic fever; joints of upper extremities chiefly,	.....	4 days,	
Female.....	20	Rheumatic fever; wrist and elbow on left side, with right ankle,	9 days,	3 days,	
Female.....	23	Rheumatic fever; knees chiefly, but ankles also affected,	20 days,	4 days,	
Male.....	18	Rheumatic fever; knee and ankle joints,	8 days,	7 days,	
Female.....	24	Rheumatic fever; joints of right superior extremity,	.....	10 days,	
Male.....	29	Synovial rheumatism; knees, ankles, and wrists,	14 days,	9 days,	Slight swelling, with pain and stiffness on motion, remained for some time.
Male.....	47	Synovial rheumatism; knees,	9 days,	17 days,	No cardiac affection.

* Dr Lombard, in *Gazette Medicale de Paris*, 1835. † M. Chandru, in *Lancette Française*, November 1835.

It may be thought, that as Aconite weakens the heart, it is probable that it will predispose that organ to suffer in the same way as bloodletting; but this distinction must be borne in mind, that Aconite acts as a pure sedative to the vascular and nervous systems, whereas bloodletting—although it produces a similar action when practised to a moderate extent,—when performed largely and repeatedly, has a *peculiar* effect in increasing the irritability of the heart. In a strong and healthy subject, with high inflammatory fever, a free bloodletting practised at the outset, will not only be of service, in affording more rapid relief to the patient's sufferings, but will place his system in a more favourable condition for the action of Aconite, which, if *properly administered*, will prevent reaction, and remove the necessity of abstracting more blood.

Should *more extensive* trials confirm the conclusions drawn from the limited data here offered, its great superiority over the ordinary modes of treatment will be undeniable. It is true that opium is not open to the objection of increasing the tendency to cardiac affection, but while its stimulant action on the vascular system would induce us, *a priori*, in the treatment of a disease marked by great excitement of that system, to give the preference to Aconite, which from the first exerts a depressing effect upon it, actual observation, as far as it has yet been carried, leads to the same conclusion. Thus the painful symptoms are alleviated at an earlier stage of the disease, under the exhibition of Aconite, than of opium, while the final cure is more rapidly effected; the

shortest average duration of treatment by opium, viz., that furnished by Dr Corrigan of Dublin, being several days longer than that given in the table. Nor must it be forgotten that the constipation produced by the opium has frequently appeared to protract the disease.

In all the cases which I have treated with Aconite, the convalescence was extremely short, and there was much less stiffness of the joints than usually remains after the ordinary modes of treatment.

Aconite seems equally valuable in rheumatic fever and in acute synovial rheumatism. In the latter disease Dr Lombard has found it contribute powerfully to the absorption of the fluid effused into the joints. Friction of the affected joints with the tincture, also assists materially in effecting the same object, as well as in relieving the pain.

Dr Lombard* is of opinion, that Aconite acts in acute rheumatism as a specific. I am inclined, however, to refer the good effects which follow its use entirely to its great power as a sedative of the nervous and vascular systems; or, in other words, to its properties as *an anodyne* and *antiphlogistic*. I do so, because I have never seen much benefit result from its administration, unless when given to an extent sufficient to develop its physiological action in considerable intensity.

Chronic Rheumatism.—Aconite may be used both

* Gazette Medicale de Paris, 1835.

internally and externally in this disease. The internal administration seems to me preferable in what has been termed the active chronic rheumatism; that variety which is, perhaps, properly speaking, only a very mild form of the acute rheumatism, being attended with some heat and swelling of the part affected, and slight constitutional disturbance. On the other hand, I would recommend the external application of the tincture in what is called the passive chronic rheumatism, "characterised rather by coldness and stiffness of the painful joints, with entire absence of constitutional fever."* In every case, however, should the mode of treatment adopted fail to afford relief, the other should be had recourse to; while it is frequently of service to combine the internal and external use of the remedy.

From the many opportunities I have had of testing its merits, in every form of chronic rheumatism, I can speak very confidently of its value, having found it efficacious in the great majority of cases. It possesses the great negative advantage of not—like most remedies for the same disease—weakening the strength and impairing the constitution of the patient. It is not so effectual when the disease affects the smaller joints. In one case of chronic rheumatism of the fingers, which occurred to myself, as well as in another in the hospital practice of Dr Craigie, little more than temporary relief was obtained.

* Watson's Lectures on the Principles and Practice of Physic.

Lumbago.—The annexed table contains the particulars of several cases of lumbago, which I have treated with Aconite. One of these is reported in the Appendix.* It cannot be denied that the rapidity of the cure, in these cases, taken in connection with the character of the disease, which is frequently an obstinate one, augurs very favourably as to the utility of the remedy in this affection. Decided relief to the pain of the back was often obtained in the course of an hour.

TABLE OF CASES OF LUMBAGO.

Sex.	Duration of disease before treatment with Aconite.	Duration of treatment.	Treatment.
Male.....	Two weeks.....	One day.....	Internal use of Tincture.
Male.....	Ten days.....	One day.....	
Male.....	Several months..	Three weeks.....	
Male.....	Several months..	Eight days.....	
Male.....	Five weeks.....	Four days.....	
Male.....	Several weeks...	Seven days.....	Tincture used both internally and externally.
Female...	Five weeks.....	Four days.....	
Female...	Three weeks.....	Less than a week	
Male.....	Two weeks.....	Three days.....	
Male.....	Several weeks...	Two days.....	

* See Appendix, Part II., Case viii.

Erysipelas.—As far as I know, Mr Liston is the only author who has recommended Aconite in this disease. "The exhibition of the extract of Aconite in this disease (erysipelas), and other inflammatory affections," Mr Liston observes, "is often followed by great abatement of vascular excitement, so that the necessity of abstraction of blood is done away with."*

I have employed it with marked benefit in several cases, one of which, for the sake of illustration, is detailed in the Appendix.† In one case of simple erysipelas, affecting the leg, the inflammation, which was very severe, and of six days standing, was entirely subdued in two days; the pain having abated somewhat soon after the first dose, and entirely in seven hours. In another case, also of considerable severity, the pain was entirely removed in ten hours, by which time the swelling was much reduced. Every symptom of inflammation had disappeared in thirty-six hours. The arm was the seat of disease. With the exception of purging, no other treatment was adopted in these cases. The treatment of the simple form of the disease may be trusted to the Aconite alone, the bowels, of course, being at the same time attended to. In severe cases, that remedy can only be looked upon as an important adjunct to the usual remedial measures.

Carcinoma.—In two cases of cancer, in which I ad-

* Elements of Surgery, p. 61.

† See Part II., Case x.

ministered Aconite, the sufferings of the patient were much mitigated; and, from the powerful anodyne and calmative properties of the drug, I have no doubt but that it will be found useful in alleviating the pain of this disease, as well as the constitutional irritation attending it. In effecting these objects, it possesses the advantage, peculiar to itself, and especially desirable, when the continued use of anodynes for a long period is demanded, of not exerting that deleterious influence on the general health, which has led us to regard opium in such cases more in the light of a necessary evil than of a remedial agent.

Pruritus.—I have found Aconite effectual in removing the sharp pungent itching which so often accompanies cutaneous diseases. The relief experienced generally continues for a day or two. When the cuticle is entire, the pure tincture may be applied; but when broken, it is advisable to use it diluted. I have also employed it frequently in *chilblains,* with the best effects in allaying the pain and itching attending them.

Hysteria—Spasmodic Asthma.—I have seen Aconite succeed in diminishing the number and severity of the attacks in a severe case of hysteria, simulating epilepsy. Its efficacy in this case would lead me to expect benefit from its use in milder forms of hysteria, as well as in chorea, tetanus, &c. I have several times administered the tincture in spasmodic asthma, with decided benefit.

I may now briefly notice a few other diseases, in the treatment of which Aconite has been recommended, but

of its value in which I have myself had no opportunity of judging.

Arguing from its supposed diuretic effects, M. Fouquier was led to employ it in *dropsy*. Later observers have failed to obtain any benefit from its use in this disease—a result confirmatory of the observations recorded in another part of this inquiry, in reference to the physiological action of the drug on the urinary secretion.

Störck narrates a case of severe and obstinate *gout*, which yielded rapidly to Aconite. Reinhold, Collin, Murray, Van Swieten, Barthez, and others, speak highly of its value in this disease.

M. West of Strasburg ascribes to Aconite emmenagogue properties. He relates five cases of *amenorrhœa* cured by its administration, in some of which the menses had been suppressed for several years.

Störck cites a case of quartan ague which was treated successfully with it, after many other remedies had failed. Collin, Baldinger, Reinhold, Murray, Davy, and others, also speak favourably of its use in *intermittent fever*.

It has been recommended by Collin, Stoeller, Gesner, and others, in *amaurosis*, particularly when that disease is connected with chronic rheumatism or gout, or occurs in the gouty or rheumatic diathesis.

Brera, Biett, Barthez, Double, and Trousseau, have used it with advantage in syphilitic affections of the skin. Avicenna recommended it in lepra; and Dr A. T. Thompson has administered it with good effect in inveterate psoriasis.

SECTION FIFTH.

ADMINISTRATION.

Exhaustion by alcohol is the best mode of obtaining an active preparation of the plant. Cold water takes up but little of its virtues; and the expressed juice contains only a portion of its active properties; while the latter are entirely destroyed by exposure of the drug, in any of its forms, to a high temperature. These circumstances are explained by the fact, that Aconitina, the active principle of the plant, is soluble in alcohol, but not in water, and is decomposed by much heat. *Boiling in water, if long continued,* is sufficient to deprive the plant of the power of producing numbness and tingling (Geiger); but Dr Christison has ascertained that this property is not diminished by a heat of 212°, in drying the plant, or in preparing an extract from it.

These facts fully account for the variable strength and frequent inertness of many of the preparations formerly in use, such as watery extracts, expressed and inspissated juices, &c.*

* *Succus Aconiti* is a preparation which has been lately introduced to the notice of the profession by Mr Bentley, and is said by him to be

TINCTURA ACONITI.

Take of root of A. Napellus, carefully dried and finely powdered, sixteen ounces Troy; rectified spirit, sixteen fluid ounces; macerate for four days; then pack into percolator; add rectified spirit until twenty-four ounces of tincture are obtained.

It is beautifully transparent, of the colour of sherry wine, and the taste is slightly bitter.

EXTRACTUM ALCOHOLICUM ACONITI.

This is prepared by distilling, at a low temperature, the spirit from the tincture, until the consistence of an extract has been obtained. The process should be completed in a vapour bath.

Its colour is dark brown, or almost black; it has an agreeable smell, and bitter taste. The dose is one-third of a grain, thrice daily, commencing with the one-sixth of a grain.*

formed of equal parts of the expressed juice and rectified spirit. The dose is stated to be 1 minim. I have found that 30 minims may be taken without producing any effect—a circumstance readily explained by what has just been stated with regard to the activity of the expressed juice.

The *ethereal tincture of the root* is strongly recommended in some Continental works. I have found it to possess about one-half the strength of the alcoholic tincture.

* This extract is superior, in point of strength, to that of the Edinburgh College, which contains much inert vegetable matter, and is, moreover, prepared from the leaves. The alcoholic extract of Dr Lombard is much inferior to either of these, being obtained not only from the leaves, but from their expressed juice, which contains only a small

I prefer the tincture for internal administration, from its greater uniformity of action. The method of administering it varies according to the object in view.

As an *anodyne*, *anti-neuralgic*, and *calmative*, five minims ought to be given at first, three times daily, to be increased daily to the extent of one minim each dose, until the physiological effects described under the second degree of operation have been produced.

As an *antiphlogistic*, five minims ought to be given at first, and repeated in four hours; by which means the second degree of operation will, in all likelihood, have been induced. In order to sustain the sedative action thus developed, two and a-half minims are to be given every three or four hours, or less frequently, according to the effect produced.

Where this mode of administration is adopted, it is *absolutely necessary* that the patient should be seen, and his pulse examined, before the exhibition of each dose. When this cannot be done, the remedy may be given in the manner pointed out for its use as an anodyne and calmative.

The *best method* of administering the remedy in *diseases of the heart*, is to give it in smaller doses than those recommended for its use as an anodyne, but more

portion of the active properties of the plant. The activity of the preparation is still farther impaired by boiling. Accordingly, Dr L. was in the habit of administering it in doses varying from 6 to 90 grains daily.

frequently repeated, as three or four minims five times daily.

Sickness may be avoided or checked by an effervescing draught, administered with, or immediately after, the dose.

The long-continued use of Aconite occasionally renders the patient less susceptible of its influence, in which case the dose must be gradually increased.

In my own practice, I have always used the tincture, simply mixed with water, without combining it with any other medicine, as in that way only could accurate conclusions respecting its properties be arrived at. Possibly it may be advantageous to combine it with Antimony, Opium, Digitalis, Guaiac, or other remedies, according to the object in view; but, on the whole, with such an active remedy, it is advisable, unless some very decided advantage may be expected from doing so, to avoid combination, which may lead to fallacious conclusions.

External Use.—The Aconitina may be applied externally, either in the form of solution in alcohol, in the proportion of one or more grains to the drachm, or of ointment made in the following manner:—

℞ Aconitinæ, . gr. xvi.
Spir. Rectif. . m. xvi., Tere optime,
Deinde adde Axungiæ, ℥i, ut fiat unguentum.

If, as occasionally happens, this ointment, after two or three applications, fail to produce its ordinary effects,

the proportion of Aconitina must be increased to three, four, or even eight, grains to the drachm. It is much to be regretted that the difficulty of preparing the alkaloid, and its consequent high price, should prevent its more general use. A preparation of inferior quality, or, as is frequently the case, totally inert, is very commonly substituted for it in the shops—a circumstance which fully accounts for the low estimation in which it is held by many who profess to have tried it.

The tincture, however, will be found an excellent substitute. One or more drachms of it are to be rubbed over the affected part three times daily, the friction being continued at each time for a quarter of an hour, or, indeed, until the topical effects of the drug are fully developed.

It is hardly necessary to add, that, when there is any abrasion of the skin, the external application of either of these preparations may be attended with danger.

SECTION SIXTH.

PHYSIOLOGICAL ACTION OF THE OTHER SPECIES OF ACONITUM.

The observations which follow were made upon twelve species and varieties of Aconite, which I procured from the Botanical Garden, Edinburgh, through the kindness of Dr Graham and Mr M'Nab. Their respective names were determined, after a careful comparison of their characters with those furnished by Decandolle, in his Prodromus. I have arranged them under the four sections of the genus.

Section I.—ANTHORA.

Aconitum Anthora.

II.—LYCOCTONUM.

A. Lycoctonum.

A. barbatum.

A. ochroleucum.

var. *puberulum.*

III.—CAMMARUM.

*A. paniculatum.**

* The plants of this species, on which the observations have been made, were raised from roots sent by Decandolle.

A. variegatum.

A. lasiostonum.

A variety of the *A. paniculatum*, named *nasutum* in the Botanic Garden.

A. tortuosum (A. neomontanum.)

IV. NAPELLUS.

A. Napellus.

var. *Tauricum.*

var. *Schleicheri.*

In order to ascertain the comparative activity of these species, the topical effects produced on chewing a portion of the root of each were carefully observed. I also prepared tinctures of their roots, using in every case a drachm of the root to an ounce and a half of spirit. The strength of these tinctures I estimated, both by internal administration in gradually increasing doses, and that generally to individuals who had previously taken the *A. Napellus*, and were familiar with its effects, and also by application to the lips and gums.

Of the tincture of the A. Napellus, thus prepared, from 15 to 20 minims were required to produce the physiological effects described as following the administration of 5 minims of the ordinary tincture.

The roots were collected in the end of November 1843.

The following were the results thus arrived at:—

SECTION I. The only member of this section which I

examined was the *A. Anthora*. Its root has a bitter taste, and, when chewed, has no power of exciting numbness or tingling. I gave half an ounce of its tincture to a man without any effect whatever. On another occasion, an ounce was administered to the same individual, who, in the course of an hour, experienced general warmth, followed by sweating. No other symptom presented itself.

Section II. The root of all the species in this section is slightly bitter, but excites no numbness or tingling when chewed.

Of the *A. Lycoctonum* I gave half an ounce to a female without producing any effect; and the same quantity of the tincture of the *A. barbatum* produced nothing more than slight nausea. The tincture of the *A. ochroleucum* produced in two females, one of whom got 10 minims, and the other 30, general warmth, and a sense of burning heat in the face, hands, and feet, which lasted for three hours, and was followed by diaphoresis. There was no numbness or tingling, or other characteristic effect of the *A. Napellus*. Half an ounce of the *A. puberulum* produced slight and transient warmth of the surface.

Section III. Of the five species named in this section, the first three excited no numbness or tingling when chewed, and the fourth and fifth did so feebly. Geiger has ascertained that the *A. rostratum*, also belonging to this section, is equally destitute of this property. Suspecting, from the inertness of the *A. paniculatum* in this

respect, that it did not possess the active properties which its place in the London and Dublin Pharmacopœias would lead us to suppose it endowed with, I administered it repeatedly, in the form of tincture, even to the extent of half an ounce, but always without effect. I am happy to have it in my power to insert the particulars of an experiment, kindly communicated to me by Dr Christison, fully corroborative of my observations on this species.

"Three ounces avoirdupois of fresh leaves of *Aconitum paniculatum* were gathered in the Botanic Garden on the 18th June, when the plants were a foot high, covered with leaves, but without any appearance of flower buds. They were dried in the air without heat, and then subjected to a vapour-bath heat for a few minutes before being pulverised,—a process which I have ascertained to have no effect in diminishing the activity of *A. Napellus*. Neither before nor after desiccation did the leaves produce any of the peculiar tingling when chewed which is occasioned by the leaves of *A. Napellus*. The powdered leaves were exhausted with rectified spirit by the process of displacement; the spirit was chiefly distilled off, and then thoroughly expelled by evaporation over the vapour-bath; and the residue (weighing 72 grains), which had a nauseous bitterish taste, but did not affect the lips and tongue with tingling, was made into a smooth emulsion, with two drachms of water, and introduced into a large cavity in the cellular tissue of the back of a rabbit, made by introducing the finger through a small wound of the

integuments, and detaching the integuments from the subjacent muscles. No effect whatever could be observed at the time, or for two hours after, or in four, seven, or twenty-four hours. The animal all the while moved about readily, and ate cabbage freely, except for a few minutes after the operation, during which it seemed listless.

"I collected four ounces of the fresh leaves again on 27th August, while the plants were in full flower. They were dried as before, and when thoroughly dried, they were packed in a well-corked bottle. In March following, the powder was exhausted, as formerly, by rectified spirit; and the tincture was converted into an extract, with the same precautions as in the last experiment; and the extract was committed to Dr Fleming for trial on a rabbit."

The extract (amounting to nearly two drachms) here alluded to by Dr Christison, was mixed with a little water, and injected under the skin of the left lumbar region of a full-grown rabbit. No effect was produced. The animal was kept for a fortnight afterwards.

Two grains of the alcoholic extract of the *A. Napellus*, introduced into the cellular tissue of another rabbit, proved fatal in eighty minutes.*

The next two species, *A. variegatum* and *lasiostonum*, I have given internally in large doses without effect.

* See Appendix, Part I., Exp. 1.

The fourth and fifth, *A. nasutum* and *tortuosum*, I have not had an opportunity of administering internally.

The Indian Atees, or *A. heterophyllum*, also a member of the section Cammarum, appears to be destitute of the peculiar properties of the *A. Napellus*. It is described by the natives as a bitter astringent and heating stimulant, useful as a tonic, and in aiding digestion.*

Section IV. All the varieties examined under this section are equally active, both as regards their topical and medicinal action. Geiger discovered that the *A. laxiflorum*, (*microphyllum* of Decandolle), a variety of the *A. Napellus*, possesses energetically the property of exciting numbness and tingling; but probably, of all the species of the genus, the Indian *A. feroæ* is the most powerful. It is used by the natives for poisoning the arrows employed by them in the chase. They shoot their prey in the tracks leading to the watering places; and it is said that the animal is generally found dead near the latter situation.† From a series of experiments performed on animals with its root by Mr Pereira, the action of this species appears to be similar to that of the *A. Napellus*. One grain of the spiritous extract of the *A. feroæ*, introduced into the cellular tissue of the back of a rabbit, began to affect the system at the end of six minutes, and produced death in fourteen mi-

* Royle's Illustrations of the Botany of the Himalayan Mountains.

† Wallich, Plantæ Rariores Asiaticæ.

nutes. The symptoms were, difficulty of breathing, convulsions, paralysis, and insensibility of the extremities.*

The *A. ferox* is, notwithstanding its great power, used by the Hindoo physicians in cholera, intermittent fever, rheumatism, &c., and an oil is said to be distilled from it, which is employed externally in chronic rheumatism.

It is thus evident that the only species of Aconite, whose activity is such as to render them eligible for medicinal purposes, are those belonging to the section Napellus.

The above series of observations also shews that the amount of numbness and tingling felt on chewing the root indicates, with accuracy, the respective activity of the various species,—a circumstance at once explained by the fact that the power of exciting these sensations, hitherto incorrectly termed acridity, undoubtedly resides in the Aconitina which the plants contain, and is greater or less according to the amount of that principle.

* Edinburgh Journal of Natural and Geographical Science, ii. p. 238.

APPENDIX.

PART I.

EXPERIMENTS ILLUSTRATIVE OF THE PHYSIOLOGICAL ACTION OF THE ACONITUM NAPELLUS ON ANIMALS.

I. When introduced into the Cellular Tissue.

(*a*) *Experiments with the Alcoholic Extract of the Root.*

Experiment 1.—Two grains of the alcoholic extract were introduced into the subcutaneous cellular tissue of the left lumbar region of a small *rabbit*. In 25 minutes, the movements of the animal became unsteady, the limbs, especially the hind ones, feeble, the respiration difficult and noisy, the pupils contracted, and complete blindness appeared to exist. In 40 minutes, the animal was lying on its side with its muscles relaxed, and not the slightest symptom of pain was exhibited on pinching the nose, ears, or extremities. The breathing became gradually more laborious, and in 60 minutes the pupils began to dilate, and had recovered their natural size before

death, which took place in 80 minutes from the commencement of the experiment. Winking was to the last produced by irritation of the cornea.

Autopsy, immediate. The voluntary muscles contracted, though not readily, on being cut or irritated. The heart was found beating at the rate of from 35 to 40 pulsations per minute, and continued to do so for an hour; after which period contractions might still be excited by irritation or galvanism. The peristaltic motion of the intestines continued for a short time. The right side of the heart and vessels entering it were distended with venous blood. There was no vascular excitement of the part where the poison had been applied.

Experiment 2.—Two grains of the same alcoholic extract were introduced into the subcutaneous cellular tissue of a *kitten.* In about 10 minutes, there were grinding of the teeth and incomplete paralysis of the whole body, and the animal began to cry piteously. For some time it was able to move from one part of the room to another, but falling on its side every few steps. In 27 minutes it vomited a considerable quantity of white frothy matter; the respiration was now slow and laborious. In about 35 minutes, it began to make irregular leaps, knocking itself against whatever happened to be in the way, apparently quite blind. In a few minutes more it fell on its side, and lay screaming. In three quarters of an hour, the breathing was chiefly abdominal, and was slow and difficult. The paralysis was now nearly

complete, and death occurred in rather less than an hour from the commencement of the experiment. I did not observe any marked contraction of the pupils, which were dilated for some minutes before death.

Autopsy, immediate. Both auricles of the heart were contracting, the left more regularly than the right, which soon ceased to contract, while the left continued to do so for 8 minutes; right side of heart, venæ cavæ, and tributary veins turgid; blood in left side of heart dark coloured; membranes of brain and spinal cord injected with venous blood; substance of brain and cord natural. Part only of the poison was absorbed, and there was no redness at the place where it was introduced.

(*b*) *With the expressed juice.*

Experiment 3.—Forty minims of the expressed juice of the root were injected into the cellular tissue of the left lumbar region of a *rabbit.* In 2 minutes, the animal became restless, the respiration laborious, and paralysis had commenced in the extremities. In 6 minutes, this was nearly complete; the breathing was very difficult, and the pupils were slightly contracted. The respiration ceased entirely in 11 minutes, after a few slight spasmodic movements. The common sensibility was not so much impaired as in the other experiments. Irritation of the cornea produced winking as long as the breathing continued. When the latter ceased, the pupil

dilated, and winking could not be excited. A few spasmodic twitches occurred after death.

On opening the body, which was done 2 minutes after the respiration ceased, the left auricle of the heart alone was found contracting. Galvanism produced contractions of the other cavities, and continued to do so for nearly half an hour. The right side of the heart, with the great veins leading into it, were much engorged; and on cutting into the substance of the liver, much venous blood exuded from it. The left side of the heart also contained venous blood. Contraction of the larger voluntary muscles was excited by irritation, but not readily. Galvanism caused them to contract powerfully. On opening the skull, the veins of the cerebral membranes were seen to be fuller than natural. The intestinal movements continued for some time after death. A portion of the canal, about an inch in length, was painted with a strong solution of the muriate of Aconitina, when the motion almost immediately ceased, and galvanism produced only slight contraction, although previously, it had contracted the canal to nearly one-third of its natural size. No redness was observed at the part where the poison had been introduced.

(*c*) *With Aconitina.*

Experiment 4.—One-fifth of a grain of Aconitina,*

* Obtained from Mr Morson, Southampton Row, London.

mixed with a little lard, was introduced into the cellular tissue of the right lumbar region of a full-grown *rabbit*. In 2 minutes difficult breathing, accompanied with faint cries, came on; there was partial paralysis of the extremities, the limbs being spread out on either side to enlarge the basis of support; and the pupils were somewhat contracted. In 6 minutes, there were convulsions; and in 9, no feeling was evinced, on the skin of the extremities, nose, or ear, being pinched or cut. In 15 minutes, the convulsive movements were less frequent, and the breathing was more difficult, and accompanied by a stertorous noise. The pupils were then contracted, but became dilated before death, which took place after a few slight convulsions, exactly 35 minutes from the commencement of the experiment. Irritation of the cornea produced winking until the breathing ceased.

Autopsy, immediate.—Contractions were excited in the voluntary muscles, sluggishly by mechanical irritation, but energetically by galvanism. All the cavities of the heart were pulsating; the auricles regularly at the rate of 48 times per minute. The contractions of the ventricles were very irregular, and ceased first; those of the right auricle ceased last, having continued nearly at the same rate for 40 minutes. Great venous congestion; membranes of brain and spinal cord turgid; substance of these organs natural. Almost all the poison was absorbed, and there was no redness around the part where it had been introduced.

Experiment 5.—One-fourth of a grain of Aconitina,

mixed with a little lard, was introduced into the subcutaneous cellular tissue of the right lumbar region of a *cat.* The animal ran about actively for nearly 10 minutes, when it appeared to become sick, and much froth issued from the mouth. In 12 minutes, vomiting, great general feebleness, and difficult breathing, came on. In 16 minutes, the movements became somewhat convulsive. These soon ceased, and were succeeded by flaccidity of the muscles, and almost perfect paralysis. In 23 minutes, the animal was lying on its side, and breathing very slowly and laboriously. The pupils were slightly contracted, and sensation seemed entirely lost. Death occurred in 30 minutes, and slight spasmodic twitches were observed for a minute or two afterwards.

Autopsy, immediate.—The right auricle of the heart contracted for a short time. Both sides of heart contained venous blood; right side, and veins entering it, much distended; membranes of the brain and spinal cord injected with venous blood; substance of these organs natural. Part only of the poison had been absorbed, and there was no redness around the wound in the cellular tissue. The intestinal movements continued for 20 minutes. Galvanism applied to the stomach caused it to contract powerfully; the pyloric extremity was then painted with a strong solution of the muriate of Aconitina, after which galvanism acted very feebly upon it.

(*d*) *With the Muriate of Aconitina.*

Experiment 6.—One-eighth of a grain of Aconitina dis-

solved in diluted muriatic acid, was injected by a small wound into the subcutaneous cellular tissue of the right lumbar region of a rabbit, about three months old. In less than 1 minute there was weakness of the hind legs, and, in between 1 and 2 minutes, the paralysis and insensibility were nearly complete. In 3 minutes, one or two slight spasmodic twitchings of the legs took place, and in 4, the respiration ceased. There was no perceptible change of the pupils.

Autopsy, immediate.—All the cavities of the heart contracting; the ventricles most regularly. The pulsations continued for nearly 20 minutes. Brain, spinal cord, and membranes, natural. Venous congestion existed, but not to a great extent. The poison appeared to be entirely absorbed.

From the rapidity with which the fatal result ensued, there was no time for the production of much venous engorgement. To this circumstance, I believe, we are to attribute the absence of convulsions and contraction of the pupil.

For the following experiment, I am indebted to Dr Christison :—

" A tenth of a grain of Aconitina, obtained by Messrs Smith from the *leaves* of *A. Napellus*, was introduced, in the state of solution in water acidulated with hydrochloric acid, into the back of a rabbit. Convulsive respiration began in 5 minutes; then irregular muscular contractions ensued, as if from efforts, but inability, to

rise from the lying to the sitting posture; the animal became apparently insensible to pinching, motionless, flaccid, and paralytic, with occasional convulsive inspiration, as in ordinary asphyxia. Respiration ceased entirely in 10 minutes."

These experiments illustrate the greater rapidity with which the poison acts when applied in a condition favourable to absorption.

On applying the muriate of Aconitina to the cellular tissue of a pigeon, death ensued in 3 minutes, with the usual symptoms.

(e) *With the Aconitate of Aconitina.*

The aconitic acid was prepared for this, and also for experiment 28, according to the method proposed by L. A. Buchner junior, in his paper upon it. (Journal de Pharmacie, tom. xxiv., p. 403.)

Experiment 7.—One-eighth of a grain of Aconitina, neutralized with diluted aconitic acid, was injected into the left lumbar region of a full-grown rabbit. In 5 minutes, feebleness of the extremities was produced; in 10, the animal grew restless, and rushed with its eyes open against the wall, as if perfectly blind, while the breathing became slow, and was apparently performed with great difficulty; in 15, the paralysis was complete, and it was lying on its side, to all appearance dead, with the exception that respiration was still performed at long intervals, and that irritation of the cornea produced

winking. No indication of pain was exhibited on any part of the skin being pinched. In 17 minutes the breathing had ceased, and the eyelids did not respond to irritation of the cornea. The pupil was fixed and slightly dilated for 5 minutes before death.

Autopsy, immediate.—Irritation of the voluntary muscles excited contraction, but not readily. Left auricle alone contracting, which it ceased to do in 3 minutes. Both auricles remained sensible to galvanism for 8 minutes longer. This agent exerted powerful contraction in the voluntary muscles an hour after death. Right side of heart, and great veins leading into it, much engorged; venous blood in left side of heart and aorta. The greater part of the poison had been absorbed.

This experiment is interesting, as it illustrates the action of Aconitina in that state of combination in which it is supposed to exist in the plant. I may add, that the action of the muriate, in destroying the muscular irritability of the intestines, when applied locally, was satisfactorily shewn in this animal.

II. When Introduced into a Serous Cavity.

Experiment 8.—A quarter of a grain of Aconitina, mixed with lard, and introduced into the peritoneal cavity of a rabbit, produced death, with the usual symptoms, in an hour and a half.

Experiment 9.—A twelfth of a grain of Aconitina,

dissolved in diluted muriatic acid, and injected into the pleura of a full-grown rabbit, produced death in 7 minutes. It was ascertained, on dissection, that the greater part of the fluid had been removed by absorption.

These experiments shew that the poison is absorbed less rapidly, when applied to a serous membrane, than when introduced into the cellular tissue.

III. When Introduced into the Stomach.

(*a*) *Of the Rabbit.*

Experiment 10.—A quarter of a grain of Aconitina, mixed with a little lard, was rolled up in a small piece of cabbage, and introduced into the throat of a full-sized female rabbit, which had not been fed for 24 hours, care being taken that she swallowed the whole of it. The animal immediately began to move its jaws, and was continually putting up its feet as if to remove something from the lips. No other effect was observed. This lasted for about an hour; and, next morning, it was taking its food as usual, and, to all appearance, quite well. A week afterwards, it being in perfect health, another experiment was performed on it.

I repeated this experiment three times, with precisely the same result. On two of these occasions, the animals were kept for a fortnight after the administration of the poison.

Experiment 11.—One quarter of a grain of Aconitina, dissolved in diluted muriatic acid, and thrown with a syringe down the throat of a full-grown rabbit, produced death, with the usual symptoms, in 8 minutes.

(*b*) *Of the Dog.*

Experiment 12.—Half an ounce of the expressed juice of the root, mixed with a little oatmeal and warm water, was given to a young mongrel dog (weighing 9 lbs.), which, not having been fed for 24 hours, swallowed it greedily. He immediately became sick, and vomited freely, and continued sick for three hours. After this he gradually recovered, and remained well for a fortnight, during which he was kept.

Experiment 13.—A quarter of a grain of Aconitina, made into a bolus, with butter and meal, was administered to an English terrier, weighing 17 lbs. The whole of it was almost immediately rejected from the stomach, and, during the succeeding 4 hours, he continued very sick, and vomited frequently a large quantity of white, frothy, tenacious mucus; there was also much weakness and staggering. He then gradually recovered, and next day was quite well.

In the two last experiments, the recovery of the animals is to be attributed entirely to the free evacuation of the poison by vomiting.

Experiment 14.—A quarter of a grain of Aconitina

made into three small boluses, with meal and butter, was introduced into the stomach of an English terrier dog (weighing 15 lbs.), through an opening made into the œsophageal tube. The latter was then tied. In 20 minutes, severe retching came on; he began to stagger, and the respiration became laborious (18 per minute). The pulse was then 144, regular, and of good strength. In an hour and a half, it had fallen to 68, and was weak, and very irregular. In two hours and a half, it was 76, weaker and more irregular than before. The retching still continued. The respirations were 24, short and imperfect; and almost no indication of pain was afforded on the skin being pinched. He was still quite conscious, and when called by his name turned his head to the quarter from which the sound proceeded. The pupil was unchanged; the breathing gradually became more difficult; the paralysis and loss of sensation more complete, and death ensued in four hours. Irritation of the cornea excited winking until the breathing ceased; no convulsive movements were observed, with the exception of a few spasmodic twitches, which occurred immediately before death.

Autopsy (six hours after death). General venous congestion; venous blood in left side of heart. Slight increase of vascularity in various parts of stomach and small intestines, but not more than must have been occasioned by the severe and continued retching which

had taken place. Stomach distended by fluid, containing, diffused through it, some light yellow feculent matter, but no trace of the poison.

Experiment 15.—One-half of a grain of Aconitina, made into a small bolus with butter, was introduced into the throat of a colly dog (weighing 20 lbs.), which had not tasted food for 24 hours. He continued to gambol about as before, for 3 or 4 minutes, when he became languid, and seemed exhausted. In 15 minutes there was weakness of the hind-legs, which, in 5 minutes more, had extended over the whole body. In 22 minutes he was lying on his side, and evinced pain on being pinched. Much frothy saliva issued from the mouth. The pulsations of the heart, which, at first, were 200 in the minute, had now fallen to 144. In 40 minutes, part of the dose was vomited, along with a quantity of mucus. The heart's pulsations were 92, and very weak. He was still conscious, turning his head on his name being called. In 2 minutes more, he vomited another portion of the dose, mixed with slimy tenacious mucus; after which he rallied a little, got upon his legs and walked about six yards, when he again fell on his side. In 55 minutes the breathing was slow and laborious. He now evinced no pain upon being cut, and lay in a state of almost complete paralysis. The breathing became gradually slower and more difficult, and death took place in 65 minutes. No tendency to convulsive movements was at any period displayed.

Autopsy (three minutes after death). The muscles retracted from the knife when cut, but sluggishly. Both auricles of the heart were contracting, but ceased to do so in about 6 minutes. General venous congestion; stomach much contracted on itself, and containing a small quantity of the poison mixed with mucus; slight reddening of the mucous membrane, most marked towards the œsophageal and pyloric orifices. A small portion of the bolus was found in the duodenum. The vermicular action of the intestines continued for about 12 minutes. Bladder distended with urine; intestines and other abdominal viscera natural; cerebral membranes slightly injected with venous blood; substance of brain and spinal cord natural.

It is curious to observe the length of time (40 minutes) which, in this experiment, elapsed prior to the occurrence of vomiting, seeing that, in Experiments 12 and 13, it was excited almost immediately.

The three next experiments shew the effect of artificial digestion in neutralizing the poison.

Experiment 16.—The mucous membrane of the stomach of two rabbits was dissected from the other coats, and washed with cold water, until litmus no longer indicated the presence of a free acid. It was then macerated for 4 hours in water acidulated with muriatic

acid.* In this liquor, after filtration, half a grain of Aconitina was dissolved, and the mixture was digested for 6 hours at a temperature of 100° Fahrenheit, when it had evaporated to a quantity (2 drachms) convenient for introduction into the cellular tissue of the back of a rabbit. This was done, and death ensued, with the usual symptoms, in half an hour; a much longer period than the same amount of the alkaloid in a fluid form would otherwise have taken to produce the same effect.

Experiment 17.—A digestive fluid was, in the same way, prepared from the mucous membrane of the fourth stomach of a calf. In an ounce of this, one-third of a grain of Aconitina was dissolved. The solution was digested for 12 hours at the temperature of 100° Fahrenheit, when, having evaporated to about a drachm and a half, it was introduced into the cellular tissue of the right lumbar region of a young rabbit. In half an hour the symptoms of poisoning gradually supervened, and death occurred in 40 minutes.

In *Experiment* 6, where *one-eighth* of a grain, in the form of muriate, was thrown into the cellular tissue, the respiration ceased in 4 minutes.

Experiment 18.—One-twelfth of a grain of Aconitina

* In this and the two following Experiments, the directions given by Schwann for the preparation of the digestive fluid were followed. Two parts of water were used to one of the mucous membrane.—*See Müller's Archiv.*, 1836, p. 90.

was dissolved in two ounces of the same fluid, which was then exposed for 24 hours to a temperature of 100°; after which, having been diminished, by evaporation, to 2 drachms, it was injected into the cellular tissue of the back of a rabbit. In 2 hours the animal was restless, weak, and staggering, and the breathing was hurried. After continuing in this state for 3 hours, it gradually recovered.

Another rabbit, into the cellular tissue of which the same quantity of Aconitina, dissolved in diluted muriatic acid, had been thrown, died in 11 minutes.

IV. When introduced into the Rectum.

Experiment 19.—A quarter of a grain of Aconitina, mixed with lard, was introduced into the rectum of a full grown rabbit. In 1 minute it became restless, and in 3 minutes very difficult and laborious respiration, and rapidly increasing paralysis, came on. In 6 minutes, there was opisthotonos; the pupils were much contracted, and the eyelids responded to irritation of the cornea, though the animal gave no indication of sensation, when the lips or extremities were pinched. In 7 minutes the paralysis was complete, and the respirations were performed at long intervals. They ceased entirely in 8 minutes.

Autopsy, immediate.—Both auricles contracting rapidly; right ventricle not at all; left ventricle slightly.

The auricles ceased to contract in about 20 minutes, and remained susceptible to galvanism for some minutes longer. Voluntary muscles slow of contraction to mechanical irritation, but powerfully acted on by galvanism. Great venous congestion, and venous blood in left side of heart and aorta. Jugulars much distended, and very decided venous injection of the cerebral membranes; substance of brain natural. The intestinal movements continued for 20 minutes. The sensibility to galvanism of a portion of the gut was completely destroyed by painting it with the muriate of Aconitina. Rectum natural. A considerable quantity of the poison appeared to have been absorbed.

V. When introduced directly into the circulation.

For the purpose of injecting the poison, I used a nicely-pointed graduated glass syringe. To prevent the possibility of the introduction of air into the vessel, rather more than the quantity of fluid to be injected was drawn into the instrument. A drop of linseed oil was also drawn into the point of the syringe, in order to prevent the poison from coming into contact with the vessel, after the instrument had been introduced, preparatory to giving the order to inject.

One grain and a half of Aconitina was neutralized with very diluted muriatic acid, the quantity of fluid amounting to six drachms.

Experiment 20.—Three drachms of this fluid (containing, therefore, three quarters of a grain of Aconitina) were injected into the right femoral vein of a colly dog (weighing 30 lbs.) The eye almost immediately became fixed and opalescent, and the pupil dilated with surprising rapidity, so that the iris presented the appearance of a thin rim not exceeding one line in breadth. On touching the cornea, the eyelids were partially closed; but, on doing so again, in 4 or 5 seconds more, no movement whatever took place, and after a few slight spasmodic twitches, no signof life remained. The timekeeper neglected his duty in this experiment; but all those present were agreed that death must have taken place within 8 or 9 seconds.

The *autopsy* was made 1 hour after death, but nothing abnormal was observed. The blood was coagulated.

Experiment 21.—One drachm of the fluid (containing a quarter of a grain of Aconitina) was injected into the right femoral vein of a mongrel bitch (weighing 16 lbs.) The animal instantly began to struggle with much violence, and, in 15 *seconds*, the pupils dilated rapidly as in the former experiment. The eye became glazed and opalescent; the muscles were flaccid; the eyelids failed to respond

to irritation of the cornea, and every sign of animal life had disappeared in 23 *seconds* after the injection of the poison.

Autopsy, immediate.—Considerable muscular irritability. All the cavities of the heart contracting actively; the pulsations of the right side ceasing in about 12 minutes; those of the left not for half an hour. Right side of heart and great veins leading to it filled with venous blood, but not distended. The peristaltic motion of the intestines continued for 15 minutes. The blood coagulated as usual.

VI. When applied to the Skin.

Experiment 22.—Having cut the hair from the left lumbar region of a rabbit, the head of a hammer, which had been heated in boiling water, and covered with linen, was applied to the part, and retained there for about 2 minutes. The cuticle was then removed, and half a grain of Aconitina, mixed with lard, was applied to the exposed surface. No effect being produced, the application was repeated in an hour, with the same result.

This experiment would seem to shew that the application of the alkaloid to a blistered surface is not attended with such risk as some suppose; but it is doubtful how far we can apply to man an inference deducible from an experiment on the skin of the rabbit. When

the true skin is broken, the danger, as has already been shewn, becomes imminent.

VII. When applied to the Eyeball.

Experiment 23.—A small quantity of Aconitina, mixed with lard, was applied to the eyeball (which was light coloured) of a young rabbit. In 3 minutes, the pupil began to contract; and in 5, was scarcely one-sixth of the size of that of the other eye. When the contraction was extreme the pupil was insensible to light, but when only partial, it still retained its mobility. The contraction continued for about 9 hours.

I have frequently repeated this experiment on the rabbit and other animals, using, in some instances, the alcoholic extract mixed with lard, and, in others, a solution of the muriate of Aconitina, with the same result, though not always so well marked.

VIII. When applied to the Heart.

Experiment 24.—A full-grown rabbit was killed by pithing. On opening the body, which was done immediately, the heart was found contracting vigorously. The right auricle was then delicately painted with a strong solution of muriate of Aconitina. In 2 minutes its contractions became slow and imperfect, and in 8 minutes had ceased entirely. The other cavities conti-

nued to contract actively for 15 minutes, and had not ceased to do so entirely in 20 minutes.

Experiment 25.—A full-grown mongrel bitch (weighing 26 lbs.) was killed by pithing. The heart was immediately exposed, and was found contracting vigorously. The superior vena cava was then opened, and half a grain of Aconitina, dissolved in half a drachm of water, to which a little dilute muriatic acid had been added, was injected into the heart, through the orifice thus made. Almost instantaneously the contractions became quick and feeble, and in half a minute still feebler, and very slow. In a minute they had ceased entirely, only a few irregular vibrations being perceived in the auricles. In 2 minutes the organ was perfectly motionless and flaccid. In 5 minutes it was punctured in various places with the scalpel, without the slightest contraction being perceived.

IX. Experiments upon the Common Earthworm.

Experiment 26.—A few drops of a diluted solution of the muriate of Aconitina were put on a plate, and a worm placed on the spot, when it immediately began to writhe and twist itself about. In 5 minutes it moved but little, and in 12 was perfectly paralyzed, shrivelled, and apparently dead.

Experiment 27.—Another worm was so placed that one-half of it only was in contact with the fluid. This

portion was completely paralyzed in 10 minutes, while the other half remained unaffected. The animal was then dipped in water, and laid on the ground. In 35 minutes the entire worm was shrivelled and dead.

X. Experiment with Aconitic Acid.

Experiment 28.—Half a drachm of a strong solution of Aconitic acid was introduced into the cellular tissue of the left lumbar region of a rabbit. It continued restless, and apparently uneasy, for about half an hour, but no other effect was produced.

XI. Experiments on the Infusoria.

Experiment 29.—Some Aconite leaves, flowers, and pieces of root, were put into water. The infusion was kept for upwards of a month, when no animalcules were found in it; while in an infusion made at the same time with the leaves of the apple tree, and kept in the same place, they were very abundant.

Experiment 30.—I poured some water, containing a great number of animalcules, into two small test tubes, adding to one of them a drop of a solution of the muriate of Aconitina. On examining their contents next day with a microscope, I found all the animalcules dead in the tube to which the muriate had been added, while in the other they were as lively as formerly.

Experiment 31.—A drop of the water, containing the animalcules, was put on a piece of glass, which was placed under the field of the microscope. A drop of the *expressed juice of the leaves* was then added to the water, when the animalcules were observed, instead of moving actively from one part of the field to another, to whirl round on themselves, and occasionally to move in a circle with great rapidity. They continued to do so, more or less regularly, for some time, their motions becoming slower and slower, till, at length, they ceased altogether. The fluid was not sensibly diminished by evaporation. A drop of the solution of carbonate of potassa, or other *irritant* poison, produces *very different effects*. The animalcules then move forward with a rapid zig-zag motion, which becomes slower and slower, till, at length, they lie motionless and dead.

Physiological Action on Vegetables.

In the following experiments, I did not add gum to the water in which the plants were placed, as, I think that the numerous experiments performed by Marcet, in which he adopted that precaution, clearly prove that the death of the plants is produced by a poisonous influence, and not by the viscosity of the fluid containing the poison preventing absorption.

Experiment 32.—I placed a slip of the *scarlet or French bean* in a mixture of equal parts of the *expressed*

juice of the root and water, and at the same time another slip of the same size in pure water. In 4 hours the leaflets of the first hung somewhat loosely, and continued to droop, so that, in 10 hours, they were faded and shrivelled, and the whole slip was evidently dying. Though now put into fresh water, it rapidly withered and died. The other slip remained healthy and fresh for more than a fortnight. The same experiment was repeated with slips of the *rose*, with precisely the same results, excepting that the poisonous effect was longer in being produced.

Experiment 33.—I cut two equal sized slips of the *lupin*, and put the one into pure water, and the other into a mixture of equal parts of the expressed juice of the leaves and water. The first remained fresh and strong for upwards of a fortnight. In a short time, the leaflets, and afterwards the petioles, of the second, drooped a little, and, in about 9 hours, the main stem of the slip was bent over the edge of the glass, so that the leaves rested on the ground, where they withered.

The same effects, differing only in the time required for their production, were produced on young plants of the Garden Balsam and Stellaria media.

PART II.

CASES ILLUSTRATING THE PHYSIOLOGICAL AND THERAPEUTIC ACTION OF THE ACONITUM NAPELLUS.

Case I.—*Rheumatic Fever.*

J. H., ætat. 22, of sanguine temperament, a painter by trade, has had two severe attacks of rheumatism within the last three years, having been confined to bed on each occasion for many weeks. First seen on the fourth day of the present attack.

February 14.—Pulse 120, full and strong; skin hot and dry; bowels constipated; tongue furred; urine scanty, and high coloured. Shoulders, elbows, knees, and ankles, painful and tender; knees much swollen, hot, and covered with clammy perspiration; cannot make the slightest motion, from the severity of the pain. Action of heart tumultuous and strong. Has had no sleep for the last three nights. To have 5 minims of the tincture of Aconite three times daily; an ounce of castor oil.

—— 15.—Pulse 100, and softer than yesterday; action of heart much calmer; bowels have been freely

evacuated. Pains somewhat diminished, but still severe. To have 7 minims of the tincture thrice daily.

February 16.—Pulse 72, compressible; action of heart quiet; urine of natural colour, and more copious. Pains in joints very slight; can move the legs, and permit the affected joints to be handled freely.

—— 17.—Pulse 56, moderate; has some numbness and prickling in the lips and points of the fingers; complains of slight giddiness and confusion of vision. The pains are nearly gone. To have 5 minims thrice daily.

—— 18.—Pulse 56, moderate; temperature of skin natural; physiological effects slightly developed. Has no pain whatever; the swelling of the knee joints has entirely disappeared; sleeps well at night; complains only of weakness. Continue the Aconite, and to have an ounce of castor oil.

—— 19.—Bowels relieved by the medicine; urine natural; temperature and secretion of skin normal. Continues free from pain. Omit the Aconite.

—— 24.—Pulse 60, good strength. General health good. The insertion of this case in the table, p. 71, has been accidentally omitted.

Case II.—*Rheumatic Fever.*

M. H., ætat. 22, admitted into the Royal Infirmary under Dr Paterson, June 27, 1843; a maid-servant. States that she was attacked, three weeks ago, with pain,

redness, swelling, and tenderness of the left knee, accompanied by general fever. A sinapism was applied to the part, which was afterwards fomented. Much relief was experienced; but the pains soon extended to the right knee and the ankles. The disease continued stationary until yesterday, when the right wrist became affected.

At present, the right wrist and fingers are hot, red, swollen, and acutely painful, the pain being much aggravated by motion or pressure; and there is considerable tenderness, with some swelling of the knees. Pulse 90, full and strong; skin hot, bowels constipated; tongue moist, furred.

Hab. Tinct. Aconit., m. vi., ter in die,
et statim Haust. Cathart., ℥ iv.

June 28.—Pulse 72, much softer; bowels open from cathartic; says that medicine produces sickness, dryness of throat, slight numbness and prickling of lips, and giddiness. Pain, swelling, and tenderness of wrist considerably less.

Hab. Tinct. Aconit., m. vii., ter in die.

—— 29.—Pulse 72, soft; bowels open; tongue nearly clean. Motion of wrist much easier, and pain greatly abated. Cont. Aconit.

Vespere.—Pulse 56, very soft; skin cool. Pain and swelling of wrist much less; heat and redness are entirely gone.

July 1.—Pulse 66, moderate; medicine produces less

sickness than at first. Pain in wrist entirely gone; complains to-day of slight uneasiness in right elbow.

July 2.—Pulse 64, soft. She is now free from complaint of any kind, and there is no stiffness in the wrist, as there generally is in the affected joints after an attack of acute rheumatism. Has experienced, for the last two days, prickling and numbness of the fingers, lips, and cheeks. Bowels confined. An ounce of castor oil.

—— 3.—Joints continue free from pain; bowels open from medicine.

Omit. Aconit.

—— 12.—Her convalescence has been uninterrupted. The general health is now perfectly restored.

Case III.—*Rheumatic Fever.*

J. D., ætat. 40, of temperate habits; a sailor; admitted into the Royal Infirmary under Professor Henderson.

January 4, 1843.—Was attacked about a week ago with pain, swelling, and tenderness, in right knee, which soon extended to all the joints on the right side of the body. On the fourth night of the attack, the pains were transferred to the joints of the left side, affecting the knee most severely. For three days past he has felt a strong tendency to be outrageous, and has occasionally talked incoherently; has had considerable frontal headache. Has twice before suffered from acute rheumatism.

At present, complains of acute pain and tenderness in all the joints of the left side, especially in elbow, wrist, and knee; the left wrist is hot and swollen. Pulse 100, of moderate strength and volume, temperature of the surface higher than natural; bowels have been very open from colchicum, and still continue relaxed; tongue covered with a whitish fur. Opium and colchicum have been administered in full doses previous to admission, but without benefit.

Hab. Tinct. Aconit. m. vi.,
ter in die.

Jan. 5.—Pulse 84, soft; left wrist continues very tender and somewhat tumid; other joints of the same side also tender; the cerebral symptoms are entirely gone. Each dose of the medicine has produced vomiting, and a sense of heat in the throat and mouth. States that he has passed an easier night than he has done since attacked.

—— 6.—Pulse 72, moderate. Swelling, pain, and stiffness of left wrist, considerably less; pain in the other joints diminished.

—— 8.—Pulse 78, soft; skin cool; there is some stiffness of the left arm; the pain in the other joints is only felt during motion; very little sickness.

—— 9.—Pulse 70, moderate; pain and swelling of left wrist and elbow completely gone; still some tenderness of left shoulder; no tenderness or pain in joints of left leg; has passed a good night; bowels open; tongue

clean. The physiological action of the drug has been developed for the last three days with moderate intensity.

Jan. 10.—All the joints are now quite free from pain. Omit the Aconite.

—— 20.—Discharged cured. I have to add, that, on admission, the patient complained of palpitation, and that, on examination of the heart, a double bellows-murmur was heard below the third and fourth cartilages, close to the sternum. That with the second sound was faint, being scarcely audible up the sternum; that with the first was propagated along the aorta and carotids, where it became harsh; both were feeble in the region of the ventricles. Percussion was natural. Under the use of the Aconite the palpitation was much diminished, although the abnormal sounds remained unchanged.

Case IV.—*Rheumatic Fever.*

J. H., ætat. 19, admitted into the Royal Infirmary under Dr Henderson, Nov. 21, 1843, a painter, was, five days ago, after exposure to cold, attacked with severe rheumatic pains in the shoulders; two days afterwards, the ankles became painful and swollen, and next day, the left knee was affected. At present the left knee is swollen, and tender to the touch; distinct fluctuation can be detected in the joint; the left ankle is also acutely painful and tender; perspires freely.

December 13.—From Nov. 21 to the present date,

opium and colchicum have been administered with considerable benefit. On the 23d of November, symptoms of pericarditis presented themselves, but were much relieved by the internal administration of calomel and opium, and the application of leeches to the region of the heart. To-day, the rheumatic inflammation of the joints has returned with its former severity; pulse 120, full and jerking; skin hot; bowels open from medicine; tongue moist and furred.

Hab. Tinct. Aconit. m. v.
ter in die.

Dec. 14.—Pulse 90, full and soft; temperature of surface still high. After taking the medicine last night and to-day, general numbness and prickling were felt. Pain of right shoulder and elbow continues; these joints are slightly swelled and tender on pressure; left shoulder also tender. States that he slept much better last night than he had done for several nights previously.

Cont. Aconit. et Hab. Ol. Ricini, ℥ i.

—— 15.—Pulse 120, full and soft; perspires freely; bowels have been well opened; tongue clean. Both right shoulders and wrist intensely painful, but not swelled. A soft bellows-murmur is heard in the region of the ventricles during their contraction.

—— 16.—Slept well last night; pain in joints much alleviated; right shoulder, elbow, and wrist, still very tender. Pulse 100, moderate; tongue moist and nearly clean; perspires freely.

Dec. 19.—Pulse 92, full and soft; pain in right shoulder and elbow much less; pain in left shoulder unchanged; has slept well since last report; perspires freely; bowels confined; murmur with first sound of heart still audible.

Hab. Tinct. Aconit. m. vii.
ter in die;
et Pil. Colocynth. comp. ij.
statim.

—— 20.—Pulse 80, soft; bowels open; perspires freely; some pain still felt in both shoulders; there is stiffness in the other joints.

—— 21.—At *nine* A.M. 7 minims of the medicine were administered; and, at *eleven* A.M., in consequence of a mistake on the part of the attendant, a second dose of 13 minims was given, the patient still labouring under the effects of the first. At *one* P.M., he complained of great prostration of strength, total blindness, a dragging sensation over the stomach, and difficulty of breathing. He also felt intense numbness and prickling over the whole body, with a sense of enlargement of different parts. Sensibility of surface much diminished; there is some frothing at the mouth; pupils dilated; he is quite conscious and collected; pulse 150, weak and intermittent. To have a tea-spoonful of brandy every quarter of an hour. Warm cloths, with friction, to be applied to the extremities.

Three P.M.—Feels much better; numbness and prick-

ling continue in face, hands, and feet; pupils still dilated, though less so than before; pulse 66; complains of great chilliness. Rheumatic pains in the joints entirely gone.

Omit. Aconit.

Dec. 22.—Complains to-day of great weakness; some numbness and prickling still remain in the lips and fingers; pulse 72, weak.

—— 30.—Continues convalescent.

CASE V. *Rheumatic Fever—Physiological Action.*

M. R., ætat. 20, admitted into the Royal Infirmary under Dr Paterson, Nov. 23, 1843, had enjoyed good health until the morning of Nov. 18, when she was attacked with pain in the knees and ankles; next day these joints were red, swollen, and tender; on the 21st they were better, and, at present (23d) there remains only some tenderness on pressure. Both wrists and all the finger-joints are now the seat of the disease, being hot, red, swollen, and acutely painful, the pain being much aggravated by motion or pressure; there is also much tenderness of the elbow-joints. Bowels confined; tongue furred; pulse 110, full and strong; has been perspiring freely during her illness.

Hab. Tinct. Aconit. m. vi.
ter in die;
et Ol. Ricini ʒ i. statim.

Nov. 24.—Pulse 82, much softer; pain of wrist and fingers alleviated; swelling and tenderness less. Medicine produces a sensation of heat in the mouth and stomach, but no sickness or vomiting; bowels open from castor oil; has not perspired.

Hab. Tinct. Aconit. m. viii. ter in die.

—— 25.—Pulse 74, soft; wrist and finger joints much improved; tenderness of elbow and ankle joints entirely gone; no sweating; complains of medicine producing sickness and vomiting; has experienced numbness and prickling in the hands and lips, with weakness of the limbs, and giddiness.

Hab. Tinct. Aconit. m. x. ter in die,
et Pulv. effervescent. vomit. urgent.

—— 26.—Pulse 60, soft; no sickness or vomiting have been produced since last report; can move the wrists and fingers with perfect ease; pain, swelling, and tenderness of these joints gone; little or no stiffness remaining; physiological effects of the drug have been developed in greater intensity.

—— 27.—Pulse 48 and soft; every joint is completely free from pain and tenderness.

—— 28.—Pulse continues at 48, soft, regular.

Omit. Aconit.

The patient remained entirely free from pain until December 10, when, as will be seen in the report, the disease returned in the left ankle. The continuation of

the report affords an excellent illustration of the *physiological effects* of Aconite.

November 29.—Pulse 60, of moderate strength.

—— 30.—Pulse 64, full, and of good strength.

December 1, *eleven* A.M.—Pulse 72, full, and of good strength. To have 5 minims of the tincture.

One P.M.—Pulse 52, regular, and of good strength; has experienced some heat in stomach, and slight tingling of lips; these sensations are now entirely gone. To have a second dose of 5 minims.

Three P.M.—Pulse 50, and considerably weaker; ordinary physiological effects fully developed; numbness and prickling in the lips and fingers; peculiar sensation felt in teeth; sensibility of fingers much impaired; feeling of general debility.

—— 2.—Pulse 60, moderate.

—— 3.—Pulse 66, of good size and strength.

—— 5.—Pulse 72, moderate.

—— 10.—No Aconite has been administered since December 1. Yesterday morning the patient complained of pain in the left ankle, which gradually became more severe; and this morning the joint is red, swollen, acutely painful, and very tender on pressure. *Eleven* A.M.—Pulse 76, of moderate size and strength. To have 5 minims of the tincture internally; and the affected ankle to be gently rubbed with two tea-spoonsful of it four times daily, and for a quarter of an hour each time.

One P.M.—Pulse 62, slightly weaker; no sickness;

some numbness of lips. The friction on the ankle has produced intense local numbness and prickling, and the patient already experiences very considerable abatement of the pain. There is also much less tenderness. A second dose of 5 minims.

Three P.M.—Pulse 54, weak, and somewhat irregular. Last dose has produced much sickness; sensation of warmth over whole body, succeeded by numbness and prickling in lips, hands, and feet; general muscular prostration; partial blindness, giddiness, and sensation of weight pressing on body; tactile power of fingers much diminished, although the hand is capable of appreciating slight differences of temperature. No redness or swelling in the ankle, which is free from pain; tenderness on pressure very slight. To have $2\frac{1}{2}$ minims,—third dose.

Six P.M.—Pulse 48, soft and regular; physiological effects disappearing. To have $2\frac{1}{2}$ minims,—fourth dose.

Eight P.M.—Pulse 48, weak; has vomited several times since last dose; other physiological effects entirely gone. Ankle free from pain or other symptom of disease.

Dec. 11.—Pulse 60, and small; ankle continues well.

—— 12.—Pulse 68, soft. To have 5 minims of the tincture thrice daily.

—— 14.—Pulse 60, moderate; physiological effects of drug slight. To have 6 minims four times daily.

Dec. 15.—Pulse 56, small; physiological effects of medicine strongly developed; complains of cold feet; has vomited several times.

—— 17.—Pulse 50, weak, but quite regular; no sickness or vomiting.

—— 18.—Pulse 52, soft.

—— 19.—Pulse 60, soft; physiological action slight. To have $7\frac{1}{2}$ minims four times daily.

—— 20.—Pulse 48, weak; medicine acting more powerfully.

—— 21.—Pulse 62, weak; some nausea has been felt to-day; complains of slight headache.

Omit the Aconite.

—— 22.—Pulse 70, weak.

—— 23.—Pulse 80, small and soft.

—— 26.—Pulse 96, small and weak.

—— 28.—Pulse 92, small.

—— 29.—Pulse 84, small, improving in strength.

January 2.—Pulse 80, improving in size and strength.

—— 4.—Pulse 76, moderate force and volume.

—— 5, 6, and 7.—Pulse 72, moderate.

Remarks.—In this case, the sedative effect on the circulation was very decided; and it will be observed that the pulse was often much reduced in frequency, before the other symptoms of the action of the drug were developed to any extent. It also continued slow, after these had entirely disappeared, and indeed did not recover its natural character for two or three days after

the Aconite was discontinued. There seemed also to be some tendency to reaction; a condition which, as formerly noticed, frequently appears to be established after the depressing influence of the remedy has ceased. There was no marked somnolency or confusion of ideas, although vertigo, dimness of vision, and sense of weight pressing on body, were occasionally experienced. No diaphoretic or diuretic effect was ever produced; the general health continued good; the bowels were regular, and the tongue always clean. It will be observed, also, that the patient latterly became less susceptible of the influence of the medicine, requiring the dose to be gradually increased.

CASE VI.—*Chronic Rheumatism—Physiological Action.*

D. M., ætat. 31, admitted into the Royal Infirmary, under Dr Paterson, July 6th 1843, a labourer; has been suffering more or less from chronic rheumatism, affecting all the joints, for the last nine months. When first seen complained chiefly of the shoulder and wrist joints, which were tender on pressure. He obtained complete relief in five days under the internal use of the tincture of Aconite.

The following report affords a good illustration of the *physiological effects* of the medicine.

July 7, 8, and 9.—Pulse 72, of moderate strength

and volume; respirations 18. *Nine* A.M., a dose of 5 minims of the tincture.

Ten A.M.—Pulse 68, same strength; respirations 15. Second dose of 5 minims.

Twelve noon.—Pulse 60, somewhat softer; respirations 13; slight numbness, with sense of distention, in fingers and lips. Third dose of $2\frac{1}{2}$ minims.

Two P.M.—Pulse rather irregular. To have 3 minims —fourth dose.

Four P.M.—Pulse 56, soft; respirations 12; numbness and prickling general over body; sensibility of fingers impaired; feels exhausted.

July 10. *Ten* A.M.—Pulse 66, of moderate strength; respirations 16. To have 5 minims.

Eleven A.M.—Pulse 64, softer; respirations 14. Second dose of 5 minims.

Twelve noon.—Pulse 56, soft; respirations 12.

Three P.M.—Pulse 68, irregular; respirations 14; numbness and tingling in lips and fingers. Third dose of 6 minims.

Nine P.M.—Pulse 44, very weak, but regular; respirations variable; numbness and tingling of face and hands entirely gone; complains of weakness, and of giddiness on sitting up.

—— 11.—Pulse 56, soft; respirations 15.

—— 12. *Ten* A.M.—Pulse 60, of moderate strength; respirations 16. First dose of 5 minims.

One P.M.—Pulse 52, same strength; respirations 14. Second dose of 5 minims.

Four P.M.—Since last report he has been out of bed, contrary to order.

July 13.—Pulse 60, moderate; respirations 16.

—— 14. *Nine* A.M.—Pulse 60, moderate; respirations 18. First dose of 5 minims.

Twelve noon.—Pulse 54; respirations 15. Second dose of 5 minims.

Three P.M.—Pulse 60, weaker; feels numbness and tingling, with sense of distention in lips. 3 minims—third dose.

Six P.M.—Pulse 60, still weaker, irregular; respirations variable; general numbness and tingling, with feeling of debility. 3 minims—fourth dose.

Nine P.M.—Pulse 44, weaker than before, labouring, and slightly irregular; cardiac sounds faint, and occasionally confused and imperfect; respirations variable; numbness and tingling general; sensation of fingers and lips blunted; complains of great weakness; vertigo; and, on assuming the erect posture, falls back in a fainting state.

Omit. Aconit.

—— 15.—Pulse 48, weak, but regular.

—— 16.—Pulse 60, improving in strength; feels languid, and still complains of general weakness.

—— 18.—Pulse 74, moderate; general strength completely restored.

It will be observed, that the pulse was frequently much reduced, prior to the occurrence of decided numbness and tingling; and it is also worthy of notice, that it never recovered itself during the night; so that each morning previous to the administration of the medicine, it was less frequent than it had been on the preceding one.

Case VII.—*Chronic Rheumatism.*

M. W., ætat. 57, was affected with severe rheumatic pains, of four months' standing, in the shoulder, hip, knee, and ankle joints, which she attributed to exposure to cold and wet. The tincture was administered internally for ten days, with the effect of affording permanent relief.

Case VIII.—*Lumbago—Physiological Action.*

W. M., ætat. 44, complains of severe pain in the loins, which is much aggravated by motion; there is considerable tenderness on pressure over the lumbar muscles. Attributes his complaint, which is of five weeks' standing, to over-exertion in lifting heavy loads.

July 14. *Twelve noon.*—Pulse 62, of moderate strength. First dose of 5 minims of the tincture of Aconite.

Three P.M.—Pulse unchanged; slight numbness and feeling of tension in face; pain of back already relieved. Second dose of 5 minims.

Six P.M.—Pulse 60, weaker; some nausea; numbness and tingling in lips and fingers; can move with much less pain than formerly. Third dose of 5 minims.

Nine P.M.—Pulse 48, weak, labouring, and slightly irregular; there has been some vomiting; numbness and prickling, with sense of enlargement in various parts of body; pain in lumbar region gone.

Omit the Aconite.

July 15.—Pulse 54, of moderate strength; still complains of weakness.

—— 17. *Ten* A.M.—Pulse 60, moderate; says that the pain in the lumbar region has returned to a slight extent. First dose of 5 minims.

One P.M.—Pulse 58, weaker; numbness of lips and fingers. Second dose of 5 minims.

Six P.M.—Pulse 52, regular, same strength; pain of back entirely removed. Third dose of 5 minims.

Nine P.M.—Pulse 36, weak, but regular; slight sickness; general numbness and prickling; sense of touch much blunted; but he can distinguish a slight difference in temperature; complains of languor and muscular debility.

Omit the Aconite.

—— 18.—Pulse 54, soft.

—— 19.—Pulse 62, moderate; general strength completely restored.

I saw him four months afterwards, when he was quite well, and had continued free from the complaint.

CASE IX.—*Abdominal Aneurism, attended by severe neuralgic pains; tincture of Aconite afforded much temporary relief,—Physiological Action.*

J. W., ætat. 40, admitted into Royal Infirmary, Edinburgh, under Dr Paterson, July 5, 1843, with an aneurismal swelling (of two years' standing) of the abdominal aorta, situated immediately below and to the left of the xiphoid cartilage. It pulsates strongly, and a purring tremulous sensation is communicated to the hand; two murmurs are heard,—the first, which is the louder of the two, corresponding to the dilatation of the sac,—the second to its subsidence. Posteriorly, on the left of the spine, a pulsating swelling is observed, and two sounds are audible, corresponding to the pulsations of the heart. The first of these is accompanied by a slight bruit. When lying in bed, he feels the tumor in the back pulsating with great force. He suffers from constant and severe lancinating pains in the left side of the abdomen, and extending downwards to the left groin, and around the hip-joint. Has been affected with palpitation at the heart for nearly a year. Heart pulsates strongly; sounds normal; pulse 84, full and firm. Has been repeatedly cupped, leeched, blistered, &c., over the seat of the pain, with occasional though slight benefit.

He took the tincture of Aconite almost daily for upwards of a month, and uniformly experienced great relief to the neuralgic pains while under its influence; the force

of the pulsations in the tumor was at the same time remarkably diminished; the abnormal murmurs acquired a soft blowing character, and the second of them was frequently entirely absent; the patient could not feel the pulsation in the back, and the bruit which accompanied the first sound in that situation was, for the most part, inaudible. Death ensued on the 18th of August, by rupture of the sac, and escape of blood into the subperitoneal cellular tissue.

The report which follows is inserted as being illustrative of the effect of the medicine on the *circulation* and *respiration*:—

July 7. *Three* P.M.—Pulse 84, full and strong; respirations 18. To have 5 minims of the tincture.

Five P.M.—Pulse 76, much softer; respirations 16. Second dose of 5 minims.

Seven P.M.—Pulse 76, weak; respirations 16.

—— 8. *Nine* A.M.—Pulse 84, but not so strong as yesterday, before medicine was given; respirations 18. First dose of 5 minims.

Ten A.M.—Pulse 76, same strength; respirations 16. Second dose of 5 minims.

Twelve noon.—Pulse 72, same strength; respirations 14. Third dose of 5 minims.

One P.M.—Pulse 50, soft and occasionally irregular; respirations 12.

Three P.M.—Pulse 42, soft and regular; respirations 11.

Seven P.M.—Pulse 64, weak.

Nine P.M.—Pulse 64, soft, regular; respirations 14.

July 9. *Nine* A.M.—Pulse 80, soft; respirations 18. First dose of 5 minims.

Ten A.M.—Pulse 76, same strength; respirations 15. Second dose of 5 minims.

Eleven A.M.—Pulse 72, softer; respirations 13. Third dose of 5 minims.

One P.M.—Pulse 44, soft, regular; respirations 12.

Two P.M.—Pulse 68, much weaker and irregular.

Four P.M.—Pulse 72, small and soft, more regular; respirations varying, average 17.

—— 10. *Ten* A.M.—Pulse 72, of moderate force and volume; respirations 17. First dose of 5 minims.

Eleven A.M.—Pulse 68, softer; respirations 15. Second dose of 5 minims, and at *twelve noon* a third dose of the same amount.

Two P.M.—Pulse 60, weak and irregular; respirations varying from 12 to 19.

Four P.M.—Pulse 52, and very irregular; respirations also very irregular, being sometimes short and hurried, at other times deep and sighing. Not seen in the evening. On July 11, 12, and 13, the medicine was not administered.

—— 14. *Nine* A.M.—Pulse 84, moderate size and strength; respirations 17. First dose of 5 minims.

Twelve noon.—Pulse 66, weaker; respirations 15. Second dose of $2\frac{1}{2}$ minims.

Three P.M.—Pulse 72, weak; respirations 15. Third dose of 2½ minims.

Six P.M.—Pulse varying between 60 and 70, weak. Fourth dose of 2½ minims.

Nine P.M.—Pulse varying between 40 and 60, weak and labouring; respirations variable. Omit Aconite.

July 15.—Pulse 60, weak; respirations 15.

—— 16.—Pulse 76, soft; respirations 17.

—— 17.—Pulse 84, moderate; respirations 18.

—— 18.—Pulse 92, moderate; respirations 20.

—— 19, 20.—Pulse 84, moderate. On the 21st the Aconite was resumed.

CASE X.—*Erysipelas of the foot—Physiological Action.*

C. R., a young woman, ætat. 25, was attacked with pain in the foot six days ago. This has since gradually increased, and the foot and ankle are now (January 25, 1844) swollen and erysipelatous; pulse 92, full and strong; skin hot and dry; much thirst; bowels confined; tongue furred. *One* P.M.—To have 5 minims of the tincture of Aconite; an ounce of castor oil.

Four P.M.—Pulse 88, same strength; foot much easier. Seven minims—second dose.

Six P.M.—Pulse 80, softer; feels numbness and prickling, with a sense of swelling in lips and tongue. Third dose of 5 minims.

Eight P.M.—The foot is now free from pain; swelling

much diminished. Pulse ranging from 40 to 60, and varying much in strength, size, and frequency; occasionally there is no perceptible heat at the wrist for 10 seconds; such an intermission being usually followed by a number of small quick pulsations. Complains of vertigo; dimness of vision; dulness of hearing; prostration of strength; general numbness and tingling, with sense of enlargement of different parts of the body. The cardiac sounds are sometimes natural, but feeble; at other times irregular, as if a number of imperfect pulsations occurred in rapid succession.

Ten P.M.—Pulse averaging 60, weak, and still irregular; complains of chilliness of the hands and feet, which are cold to the touch.

Jan. 26.—Pulse 76, soft, regular; sounds of heart normal; bowels open from castor oil; tongue moist, furred; swelling of foot much less; pain entirely gone; still some redness and tenderness. To have 7 minims of the tincture thrice daily.

——— 27.—Pulse 68, soft; skin cool; the foot is now well, some œdema alone remaining. Omit the medicine.

Case XI.—*Tic Douloureux.*

J. A., ætat. 45, has been affected with tic of the right infra-maxillary nerve for seven months past; the paroxysms vary in duration from 1 to 5 hours, and the remissions from 2 to 4 days. Several of the remedies

usually had recourse to in such cases, have been prescribed, but without affording more than temporary benefit. *June* 20, 1842.—She is directed to rub the affected part thrice daily, as well as on the occurrence of a paroxysm, with a tea-spoonful of the tincture; the friction being continued for 20 minutes at each time.

On the fourth day of the treatment, a paroxysm occurred, which was speedily checked by the application of the tincture. On the 6th day the medicine was also prescribed internally in the dose of 6 minims thrice daily. This treatment was continued for 7 days more, during which time there was no return of the complaint; she continued well. I saw her last in October 1843.

Case XII.—*Sciatica.*

J. G., ætat. 28, had been for five weeks subject to pain in the course of the right sciatic nerve, extending downwards along the calf of the leg to the ankle. A constant dull pain was felt, but there were frequent exacerbations of a very severe character. Motion of the extremity was extremely painful, and there was much tenderness over the nerve. He was ordered to take 6 minims of the tincture of Aconite three times daily.

The first dose afforded considerable relief; and on the third day of the treatment the pain was almost entirely gone. The medicine was discontinued on the

fourth day, and two days afterwards the pain returned, but less severely than before. The Aconite was resumed in 7 minim doses, and in three days had effected a complete cure. I saw him 7 weeks afterwards, when he was quite well.

Case XIII.—*Hemicrania.*

E. W., ætat. 43, states, that she has, for upwards of three weeks, suffered from more or less constant pain, extending over the temporal and frontal regions of the left side of the head. Firm pressure on the part diminishes the pain; exposure to cold, wet feet, or anxiety of mind, usually brings on an attack, if it is absent, or increases its severity, if present. Has taken opium with partial relief. To rub in a tea-spoonful of the tincture of Aconite thrice daily.

The first application afforded much relief; and in five days she was quite well. Ten weeks have now (February 1843) elapsed, and I understand there has been no return of the pain. After each application of the tincture, which produced the usual numbness, tingling, and dragging sensation in the skin, there was more or less blindness of the left eye. I saw her twice while thus affected; on one occasion the pupil did not seem to be changed; but the second time, the dimness of sight being greater, it was decidedly larger than its fellow.

CASE XIV.—*Post-febrile Neuralgia of both feet.*

This case occurred in the Royal Infirmary, under Dr Cormack, and was communicated to me by Dr Martin Barry.

H. M., ætat. 15, on the third day of his convalescence from an attack of typhus fever, was seized with lancinating pains in the toes. These gradually became more severe, and in three days both feet were affected with acute pains, shooting in the course of the nerves. The pains are almost constant, and are most severe at night, preventing sleep ; they are aggravated by motion or pressure. To have an ointment of veratria applied to the feet three times daily.

This treatment was continued for 5 days without apparent benefit. *March* 8,—to have 4 minims of the tincture of Aconite thrice daily.

A quarter of an hour after taking the first dose, great relief was experienced. The medicine produced its ordinary physiological effects ; and as these wore off, the pains returned, but less severely than before. On the 9th the dose was increased to 5 minims; on the 10th to 6, and on the 11th to 7. Every successive dose afforded increased relief; and on the 12th the pains were entirely gone. The medicine was now omitted. He continued well.

CASE XV.—*Case of Neuralgic Stump, after amputation at the thigh, in which much temporary relief was obtained by the use of the Aconite, occurring under Dr Duncan, in the Surgical Wards of the Royal Infirmary.* Illustration of the apparent cumulative action of the remedy.*

The pains, which are of a gnawing and lancinating character, and of several years' duration, are most severe at night, and the patient enjoys no sleep except what is obtained by the use of opiates. The surface of the stump is very tender, pain being excited by the slightest touch. Every possible means have been tried, but all without effect, with the exception of blisters, which afforded temporary relief. *February* 25, 1844.—He is ordered 5 minims of the tincture of Aconite thrice daily.

March 7.—Ever since the tincture was commenced, he has been enjoying more and more freedom from pain, and while under the action of the drug, it is entirely absent; he can now permit the stump to be handled, with little inconvenience. His general health is much improved. Soon after taking a dose, he experiences warmth in the stomach, with slight difficulty of deglutition, and in about 15 minutes, general numbness and prickling, particularly in the stump, where they are first felt; the extremities feel (to use his own expression) as

* The history of this case, by Dr Duncan, will be found in the Northern Journal of Medicine, vol. i., p. 370.

if they were "sleeping;" the sensibility of the fingers is blunted; he feels weak and listless, and there are sometimes slight giddiness and dimness of vision. After some minutes, a copious perspiration breaks forth over the surface. The numbness and tingling continue for about two hours.

March 9.—Has continued the use of the medicine until to-day, when he complains of pain and uneasiness of the stomach, with loss of appetite. He is also affected with a dull heavy pain in the eyeballs, dimness of vision, and profuse secretion of tears; the pulse is accelerated, the skin hot; he complains of weakness and has much thirst.

Omit the Aconite.

—— 14.—The pain and watering of the eyes are now much diminished, their vascularity has not been increased. Complained, for a day or two, of black specks floating in the field of vision; the pain and uneasiness of stomach are now gone, and his appetite is improving; there has been no tendency to diarrhœa. Has not sweated since the Aconite was discontinued. Its internal administration was not resumed.

In a few days the pains in the stump returned, though with much less severity than formerly. The tincture was then applied externally for three days, with decided but only temporary benefit. A great variety of other anti-neuralgic remedies were afterwards had recourse to, but the sufferings of the patient still continue severe.

Case XVI.—*Palpitation of the Heart.*

This case occurred in the practice of Dr Smith, Lasswade, and was communicated to me by his assistant, Dr Thomson.

April 10, 1845.—A. L., ætat. 23, a gardener, married, is of a nervous temperament, slender but evidently muscular conformation, and exhibits a depressed and melancholy aspect. For the last four weeks (having previously enjoyed good health) has suffered from strong and tumultuous action of the heart, frequently becoming so marked that the pulsation of the heart can be seen and heard at a considerable distance from the patient. It is attended by a distressing anxiety, and a disagreeable sense of pressure on the chest; and pain is occasionally experienced in the cardiac region. He has never been affected with difficulty of breathing. On several occasions when the palpitation was very severe, vertigo and tendency to syncope were induced. The affection occurs in paroxysms which may continue for 7 or 8 hours. In the intervals he enjoys almost complete immunity from the painful symptoms.

Dulness, upon percussion, in the cardiac region was found to be of the natural extent, and the apex of the heart was pulsating in its normal situation. On applying the stethoscope during a paroxysm, the head was forcibly raised by the violence of the pulsations, the first

sound was heard to be shorter and louder than natural; the rhythm was regular; and no morbid sounds were present. The action and sounds of the heart were more diffused than usual. Pulse firm, quick, and regular.

Hab. Tinct. Aconit. m. iij. ter in die.
Farinaceous diet, with a small proportion of animal food.

April 12.—The paroxysms of palpitation have been less violent and of shorter duration; but pain of præcordia and throbbing in temples are somewhat increased.

—— 14.—Heart's action much subdued; pulse softer and less frequent. Complains of numbness and prickling in lips and fingers, and a disagreeable sensation over the scalp, as if a string were tied tightly round the head. Notwithstanding the marked improvement of the heart's action, as there was no mitigation of the pain in the cardiac region, it was deemed advisable to intermit the Aconite, and to order a calomel and opium pill every six hours.

—— 15.—Pain very little abated. Since the Aconite has been discontinued the pulse has resumed its former firm and bounding character. Apply 12 leeches over the seat of pain.

—— 16.—The pain is mitigated, but still severe. The heart's action is now as violent as at the commencement of treatment. Apply a blister over the cardiac region.

—— 17.—Pain is nearly gone. Heart's action as before, accompanied with the feeling of great tightness

across chest, and severe throbbing of temples. The Aconite to be resumed in the same doses as formerly.

April 19.—Decided improvement in heart's action. Numbness and tingling of lips and fingers.

—— 20.—Has had scarcely any palpitation.

The use of the Aconite was continued for a week longer; at the end of which time the cardiac symptoms were entirely removed, and the patient was enabled to resume his occupation.

June 3.—Since last report he has only once experienced a threatening of his former symptoms, when he immediately had successful recourse to the Aconite. So far from there being any palpitation present, the heart was with difficulty felt beating under the left nipple; the pulse was moderately full, and of natural frequency; general health good.

CASE XVII.—*Illustrating the Physiological Action.*

C. R., ætat. 19, a healthy and robust female, has been confined to bed for a few days, in consequence of a sprain of the ankle.

Dec. 21.—Pulse 74, of moderate force and volume. She perspires gently at night. To have 5 minims of the tincture thrice daily.

—— 22.—Pulse 72, moderate. Perspired last night more freely than usual.

—— 24.—Pulse 70, weaker, and slightly irregular.

After each dose she has sweated copiously. The other effects of the medicine have been produced in moderate intensity. To have 7½ minims thrice daily.

Dec. 29.—Pulse for the last five days averaging 60, soft. Perspires less than formerly.

—— 31.—Pulse 64, small, and slightly irregular; considerable numbness, prickling, &c., are produced after each dose, but no sweating as at first.

Jan. 2.—Pulse 68, small and weak. The following symptoms have been experienced from the medicine:—General warmth; numbness and prickling; crampy pains in the muscles; dazzling and dimness of vision; sickness, rarely vomiting; loss of power over the extremities; great lassitude, and impaired sensibility of surface. The numbness and tingling are first felt in the sprained ankle, where they are accompanied by slight pain. These symptoms begin to appear half an hour after the exhibition of a dose, and continue for two or three hours.

—— 3.—Pulse 76, weak, and slightly irregular.* To have 10 minims thrice daily.

—— 4.—Pulse 58, weak, and occasionally irregular.

Omit the Aconite.

—— 5.—Pulse 68, slightly irregular.

—— 6, 7, and 8.—Pulse 72, regular, and of good size and strength.

* It will avoid repetition to state, that after December 29, the cutaneous secretion did not appear to be increased.

Jan. 9. *Two* P.M.—Pulse 72, moderate. To have 8 minims.

Four P.M.—The pulse has been examined every five minutes since the medicine was given; at 3 P.M. it was first observed to be softer, and is now reduced also in frequency; pulse 64, soft; experiences numbness of the lips, with a peculiar sensation at the roots of the teeth; feels weak and languid. To have 5 minims.

Six P.M.—Pulse averaging 60, weak, and irregular; no sickness. To have 5 minims—third dose.

Eight P.M.—Pulse 72, weaker, and irregular; complains of confusion of sight, headache, and slight giddiness; she has been vomiting.

Ten P.M.—Pulse 72, soft, regular. The effects of last dose have passed off.

Jan. 10.—Pulse 72, moderate. 5 minims of the tincture were given at 8 A.M., and also at 10 A.M.

Twelve noon.—Since eight o'clock the pulse has been examined nearly every ten minutes; there was no appreciable change until about eleven, when it became perceptibly weaker. It is now 60, and weak. 5 minims—third dose.

Two P.M.—The pulse is irregular in point of strength, fulness and frequency, sometimes beating so low as 11 in the quarter, when it is soft and comparatively full, at other times rising to 32, when it is small and weak. Sounds of heart faint and occasionally confused and irregular. The last dose produced warmth of stomach and nausea; but only slight tingling of lips. Complains

of want of power to move the limbs, and of giddiness on sitting up in bed.

Six P.M.—Pulse averaging 70, irregular; a steady beat of pretty fair strength, alternating with a small, quick, and almost imperceptible one. No other symptom is present.

Nine P.M.—Pulse 68, small and weak, but regular.

Jan. 11. *Eight* A.M.—Pulse 70, weak. To have 10 minims.

Ten A.M.—Pulse 44, small, weak, and occasionally irregular. Shortly after nine o'clock she was affected with sickness, vomiting, a strong sense of constriction in the throat, and slight difficulty of swallowing. The latter symptoms still continue. The other and more usual effects of the drug have not been produced.

Three P.M.—Pulse 84, small, and weak. About *eleven* A.M. numbness and tingling came on, accompanied with great powerlessness of the extremities, and a sense of weight pressing on the belly.

Omit the Aconite.

Jan. 12.—Last night at eleven o'clock, after having recovered from the effects of the Aconite taken in the morning, she was seized with general trembling, violent headache, pain of eyeballs, constant lachrymation, and intense photophobia; the skin was hot and dry. She has spent a very restless night, and these symptoms still continue, with somewhat diminished intensity. The vascularity of conjunctiva is not increased. There is thirst

and anorexia; tongue moist, slightly furred; pulse 78, weak, and slightly irregular.

Jan. 13.—Remained in the same state until last night, when she was somewhat relieved, and fell asleep. She is nearly well to-day; but there is still some trembling of the hands; temperature of skin elevated, tongue nearly clean, appetite improving; has not perspired; pulse as yesterday.

—— 14.—Pulse 76, regular; much improved in size and strength. The tremors are entirely gone.

—— 15.—Pulse 72, of moderate size and strength.

—— 19. *Ten* A.M.—Pulse 80, moderate. To have $7\frac{1}{2}$ minims.

One P.M.—Pulse 60, same strength and size. Last dose produced heat of stomach, then tingling and warmth, first in the affected ankle, and afterwards over the whole surface; pains in the joints, slight dimness of vision, languor, and muscular weakness. Now complains only of chilliness of the extremities. 3 minims—second dose.

Four P.M.—Pulse 66, soft, regular; has had numbness and tingling of lips and hands. 3 minims—third dose.

Six P.M.—Pulse 56, weak, and irregular. 3 minims—fourth dose.

Eight P.M.—Pulse averaging 64, weaker, and irregular. 3 minims—fifth dose.

Ten P.M.—Pulse 40, weak, and nearly regular. Last dose produced much nausea, and soon afterwards difficulty of swallowing, with a sense of suffocation. These

feelings gradually became more intense until vomiting came on, when they disappeared. They returned several times, and were relieved in the same manner. There is still some dyspnœa. She complains of chilliness of the extremities, which are cold to the touch. The fingers are pale and bloodless. At twelve o'clock the pulse was 84, and very weak.

Omit the Aconite.

Jan. 20. *Ten* A.M.—Pulse about 70, weak, still irregular; choking sensation entirely gone.

Six P.M.—Pulse about 76, slightly irregular, improving in strength; great general debility; says she feels as if recovering from fever; complains of thirst and headache; temperature of skin slightly increased.

—— 21. Pulse 80, improved in strength, but continues slightly irregular; still some thirst and headache; general strength somewhat improved.

—— 22.—Pulse 78, rather fuller and firmer than natural; headache gone; skin cool; appetite, which has been impaired for two days, improving.

—— 23, 24, and 26.—Pulse 72, regular, and of moderate force and volume; general health and strength good.

Remarks.—As in several other cases, the depressing effect on the circulation was here frequently manifest before any other symptom of the action of the drug had been developed. When the pulse had been much re-

duced in strength or frequency, it was not restored to its natural standard for one, two, or three days. Some tendency to reaction was also exhibited. Thus, on January 19, the pulse had risen to 80, and was of moderate strength. It was on that day reduced, by Aconite, to 40, at the same time becoming weak. The medicine was then omitted; and, on the morning of the 20th, the pulse was 70, weak, but irregular; and in the evening, 76, and improved in strength, though still irregular. On the 21st, it was 80, stronger, and only slightly irregular. On the 22d, it was 78, regular, and of more than usual size and strength. On the 23d and 24th, it was normal, being 72, regular, and of moderate size and strength. It is worthy of notice, that various other symptoms were frequently induced, in considerable intensity, when little if any numbness and tingling were experienced; shewing, that the amount of numbness produced cannot be regarded as indicating, with accuracy, the degree in which the physiological effects of the drug have been developed. The muscular debility was well marked, and, as will be observed, continued for a day or two after the Aconite had been omitted. Thus, on January 20th, 21st, and 22d, she complained of weakness, although no Aconite was taken after the 19th.

For the first nine days of the administration of the medicine, a decided diaphoretic effect was produced, but never afterwards. *Lastly*, This is one of the cases formerly noticed, as affording some evidence that Aconite possesses a cumulative action. See reports of January 12 and 13.

PART THIRD.

CASES OF POISONING.

Valentini has recorded a case of murder by poisoning with Monkshood, which took place at Copenhagen ;* and, more recently, an interesting case of the same kind which occurred in Ireland, has been detailed by Dr Geoghegan.

I. Mr Pereira† details the particulars of the poisoning of a man, his wife, and child, who partook of the root at dinner, having mistaken it for horse-radish. The man had taken about one root and a half. Three quarters of an hour afterwards he complained of burning and numbness of the lips, mouth, and throat, which soon extended to the stomach. Violent and constant vomiting then came on, and continued until within half an hour of his death. He was also affected with warmth of the chest, coldness of the extremities, pain in the head, and excessive trembling. He frequently raised his hand to his throat. He was quite conscious till within two minutes of his death, which occurred in four hours. He expired in a fainting state. The woman, who ate about half a root, experienced nearly the same symptoms.

* Pandectæ Medico-Legales, 141.

† Elements of Materia Medica, ii., p. 1339.

The paralysis and disorder of the external senses were greater; the sensibility of the body was much impaired, and she lost the power of articulation. She felt very giddy, but was neither delirious nor sleepy. Like her husband, she frequently put her hand to her throat. As in the former case, there was no purging. In five or six hours she began to recover, and her natural warmth returned. The remedies employed were—an emetic, castor oil, and alcoholic stimulants.

II. Mr Sherwin's case. A woman swallowed, by accident, a mouthful of the tincture of the root. In five minutes she was seized with general prickling and tingling; and a sense of enlargement of the face and constriction of the throat. In twenty minutes, sickness, blindness, and great feebleness of the extremities came on. When seen by Mr Sherwin, in about two hours, the eyes were fixed and protruded, the pupils contracted, the countenance livid, jaws and fauces rigid, the extremities cold and pulseless, the breathing imperfect and laborious, and the action of the heart quick and fluttering. On administering an emetic, convulsions, followed by copious vomiting, supervened. The pulse at the wrist then returned, and the symptoms continued to improve under large draughts of warm water, and an occasional dose of ammonia. In four hours they again became alarming; and the complexion, as well as the turgid state of the veins of the neck, indicating congestion of the brain, a

pint of blood was withdrawn from the external jugular. This afforded great relief; the breathing became easier, the sight improved, the pupils dilated, and the pulse returned to the wrist. She gradually recovered. There was no purging, and consciousness was retained throughout.*

III. Four individuals were taking the alcoholic extract of Aconite as a remedy for rheumatism. A new sample of the drug, which proved to possess much greater activity than that formerly administered, was procured and given in the usual doses. Shortly after the first dose, the ordinary symptoms of the action of the medicine came on; but instead of gradually ceasing, as they had done on former occasions, were, in a few minutes, succeeded by burning in the mouth and throat, vomiting, lancinating pains of the joints, convulsions, contracted pupils, imperfect respiration, great reduction of temperature, weak and irregular pulse, clammy sweating, and extreme feebleness of the limbs. Two of them, who had taken respectively 2 and 5 grains each, recovered, under internal stimuli and the external application of heat and friction. The other two, who had taken respectively 4 and 10 grains each, died, one in three, the other in four hours, having retained their consciousness to the last. In the second of these, dissection revealed venous congestion of the brain and lungs, and engorge-

* Lancet, 1836-7, ii. 13.

ment of the right side of the heart, as well as of the liver and spleen.*

IV. Degland has described four cases where poisoning was caused by a tincture supposed to be made from the root of Aconite; although, from the general character of the symptoms, this seems questionable. An old woman who prepared the mixture, took two ounces and a half at midnight, and died before morning. Three other individuals took each half an ounce, and were attacked with burning pain in the throat and stomach, severe colic, abdominal tenderness, vomiting, and purging. One of them became violently delirious, but subsequently recovered. The other two died, one in two hours, the other half an hour later. Dissection displayed unequivocal marks of gastro-intestinal inflammation. The poison, which was found in the stomach of each, is described as having had a bitter taste; but it does not appear to have produced numbness or tingling.†

V. The following case of murder, by poisoning with the root of Monkshood, is narrated by Dr Geoghegan. The woman, Mary Anne M'Conkey, who committed the crime, was tried at the Monaghan Assizes in 1841.

"The prisoner, who had been too intimate with another man, and had been heard to express her intention of getting rid of her husband, was observed one day before dinner to separate some greens for him from the

* Pereira in La Lancette Française, Mars 1839, p. 77.

† Jour de Chim. Méd. iii., 344.

plateful intended for the rest of the family. None of the latter suffered at all. But her husband was taken violently ill immediately after dinner, and died; and a neighbour accidentally present, who partook, though sparingly, of the same dish with him, was also similarly and violently affected, but recovered. The deceased, before finishing the greens, said they had a disagreeable sharp taste, and was seized soon after with burning at the heart, tenderness at the pit of the stomach, vomiting, coldness, a sense of biting in the tongue, and tingling through the whole flesh, excessive restlessness, occasional incoherence, locked-jaw, clenching of the hands, and frothing at the mouth; and he expired three hours after the meal. His neighbour, two minutes after finishing his greens, experienced a sense of pricking in the mouth and burning in the throat, gullet, and stomach; then salivation, a feeling of swelling in the face without actual fulness, general numbness and creeping in the skin; next excessive restlessness, coldness of the integuments, dimness of sight, and stupor; about an hour after the meal he became speechless, repeatedly fainted, frothed at the mouth, and clenched his hands; vomiting ensued, with considerable relief, and subsequently he had frequent attacks of it, with purging, tenderness of the epigastrium, cramps, and tingling in the flesh; and from these symptoms he recovered so slowly as to be unable to work for five weeks. The only morbid appearance of any note in

the body of the deceased was a number of irregular brownish-black patches on the inside of the stomach." *

The prisoner was found guilty, and, previous to execution, confessed that she had poisoned her husband with the powdered root of "blue rocket," † which she said had been mixed with *pepper*, and sprinkled over the greens her husband had eaten.

VI. A male child, 13 months old, ate a piece of the root of Monkshood. In a few minutes, he was attacked with sickness, and vomited; in two hours there were coldness of the surface, pale and bloodless features, slow and intermittent pulse, dilated pupils, and extreme general prostration. Ipecacuan wine was given to increase the vomiting, and was followed up by brandy, ammonia, and strong coffee; sinapisms were applied to the epigastrium and legs. The child recovered.

VII. Ballardini's cases. Twelve individuals, labouring under skin disease, took 3 ounces each of the expressed juice of the leaves of Aconite, by mistake for that of the Cochlearia officinalis. One old man and two old women perished in 2 hours. The others, who were either below or in the prime of life, suffered severely, but were saved by the timely administration of emetics and stimulants. In a few hours, all danger had disappeared. The symptoms were, sickness and vomiting of green

* Quoted by Christison, Treatise on Poisons, 1845, p. 70.

† The name by which the A. Napellus is known to the peasantry of Ireland.

matters, with pain and tenderness of the epigastrium; vertigo, headache, dilated pupils, great muscular feebleness, with general trembling; distressing sense of sinking, difficulty of breathing, coldness of the surface, cramps of the inferior extremities, and weak, scarcely perceptible, pulse. In some of them there were green alvine evacuations; and in two of the fatal cases convulsive movements occurred before death. In the three fatal cases, the membranes of the brain were injected, and considerable sub-arachnoid effusion existed. There was general venous congestion, and both sides of the heart contained dark-coloured blood. The stomach and intestines presented, here and there, small patches of a reddish colour, and contained a considerable quantity of viscid mucus.*

VIII. The following case was communicated to me by Mr John Watt Reid, Surgeon, R.N.:—J. M., a girl aged thirteen, drank at noon, on the 5th January 1844, about an ounce and three drachms of a mixture of the tincture of the root, containing forty-eight minims of the tincture to the ounce of water. In a few minutes she complained of burning heat in the mouth and stomach, and tingling, with lancinating pains in the extremities. She was then seized with sickness, vomiting, dimness of sight, headache, great confusion of ideas, and almost com-

* Gazette des Hôpitaux, Mai 1842, quoted by Orfila, Toxicologie, 1843, ii., 360.

plete muscular depression. Her face was pale, and the whole surface was covered with clammy sweat. The vomiting continued for an hour and a half; the confusion of ideas, dimness of sight, and general prostration for the next four hours; the burning in the mouth then disappeared, but the tingling endured for some hours longer.

Stimulants were freely administered; in the evening she felt much easier, and, with the exception of weakness, was next morning quite well.

IX. I am indebted for the following case to a professional friend:—A child of three years of age swallowed a piece of bread soaked in the tincture of Aconite, given to it by an elder sister, who believed it to be something sweet. The tincture, which had been used for toothache, was incautiously left in a drawer in the nursery. In a short time vomiting and drowsiness, with feebleness of the limbs and staggering, came on. A medical man was sent for, and arrived about half an hour after the poison had been taken. He found the face blanched, the surface cold, and its sensibility blunted, the pupils much dilated, the breathing depressed, and the pulse hardly perceptible. The drowsiness and vomiting still continued, the matter vomited being white and frothy. There was complete muscular prostration, the head falling down upon the shoulders when the body was raised.

Ipecacuan wine was given, with the effect of increasing the vomiting, and a purgative enema operated freely. Vinegar and water were also administered at intervals.

The symptoms slowly improved, and in six hours the child fell asleep. It started much, but awoke next morning quite well.*

* I subjoin a list of references to all the other recorded cases of poisoning which I have been able to find :—

Willis, De Animâ Brutorum, p. 289.
Mathiolus, Comment. on Dioscorid.
Vicat. Hist. des Plantes Venen. de la Suisse, p. 8.
Haller, Mat. Med.
Philosophical Transactions, xxxviii. p. 287.
Murray of Gottingen, Apparatus Medicaminum, 1776.
Pallas, Thèse Inaugurale, Paris, 1822, quoted by Orfila, Toxicologie, 1843.
Barton and Castle's British Flora Medica.
Borda, referred to in Lond. Med. Repository, xv., 540.
Journal de Chimie Médicale, 1840, p. 95.
Seringe's Monograph on the genus Aconitum, p. 128.
Bouchardat, Annuaire de Thérapeutique, de Matiére Médicale, &c., 1844.

THE END.

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